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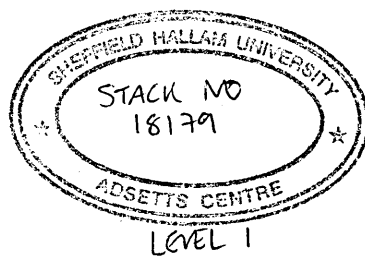
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**USER INNOVATION
IN
INFORMATION SYSTEMS
PRACTICE**

JOHN PAUL KAWALEK

**A THESIS SUBMITTED IN PARTIAL FULFILMENT OF
THE REQUIREMENTS OF SHEFFIELD HALLAM
UNIVERSITY FOR THE DEGREE OF DOCTOR OF
PHILOSOPHY**

NOVEMBER 1998



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DEDICATION

The work has been inspired by, and is dedicated to, my late parents. My father Tadeusz and my recently lost mother, Maureen. Their integrity and dedication is a lasting strength to me, as it is with all their six children.

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ABSTRACT

Our use of old words to describe new things can often hide the emerging future from our eyes.

Charles Handy, 1997, p. 28

Information systems practice in this thesis is seen to involve the everyday use of technology for information purposes. It involves individuals or user groups and specialists in applying and adapting information technology resources. The inclusion of groups other than the Information Systems specialist as playing a role in the practice of information systems, is in part the recognition that information technology is increasingly accessible. It is possible to apply Information Technology in a variety of ways by non-Information Systems specialists. This represents a shift in emphasis from the dominant assumption in much of the Information Systems literature that the practice is the sole domain of the Information Systems specialist. Further the thesis makes a critical appraisal of the effects that such an assumption has on the discipline. The perspective argued, is that the discipline has not yet effectively embraced the issues of learning and behaviour, in the context of power relationships in the everyday utilisation of the Information Technologies by non-Information Systems specialists. It tends to be entrenched in Information Technology design and development. The methodological debates associated with the underpinning of the discipline has still not embraced organisation based studies which focus on motivations and behaviours of the non-Information Systems specialists who have increasingly powerful technology at their disposal.

The thesis develops an analysis of behaviours and motivations of non-Information Systems specialists. These motivations are termed 'orientations'. By using this construction, the thesis demonstrates that the application of Information Technology can be seen as 'constrained' by social structures and 'political' forces, and as such the applications are limited to haphazard innovations with the technology. One such 'constraint' is the general lack of empathy which is heightened by some of the assumptions and approaches made by the Information Systems discipline. This tends towards the functional aspect of application development, and thereby undervaluing the requirement for learning and critical reflection by those involved in the practice of Information Systems. Findings suggest that despite the availability of powerful

technology, commonly its use as an effective information tool is constrained and limited. The application of technology is often rationalised against many different criteria's, often using language of 'efficiency': yet it is demonstrated that applications, which are applied as an 'intervention' or an 'innovation' in a perceived problem situation are behavioural reactions to a threatening social environment, rather than done as result of reflective learning and knowledge development, or one which reflectively evaluates the information value of the application. Indeed the empirical observations were surprising, in that they revealed such a high level of 'defensive' behaviour. Trust, learning and critical thinking were distinctly lacking, in the utilisation of information.

Further, the 'reactions' to the social context were commonly justified as a perceived lack of effective information provision of the existing information systems. This is partly seen as a result of a poor relationship with the Information Systems specialist and/or with the formal information systems provided. This is a direct result of some of the dominant assumptions of the Information Systems specialist. These are discussed in the thesis, and are analysed at a high philosophical level, in terms of dominant ontological and epistemological assumptions. These are seen to be related to the 'expertise' of the Information Systems specialist as concerned with the formal rationalisation of data resources. The 'formal' and 'rationalisation' of data commonly argued in the traditional Information Systems literature serve only to impose assumptions about method and task in working practice, and can in some contexts be seen as the dominance of one social grouping over another. The 'formal' and 'rationalisation' assumptions are seen to serve to dominate, and are not appropriate where the goal of new technology is to *innovate* with information for the generation of learning, questioning and new knowledge in everyday practice.

The thesis advocates an alternative 'paradigm' in the raising of 'critical awareness' of those involved in the practice of Information Systems. This is true of both specialists and non-specialists. This 'critical awareness' is seen as a learning agenda in which those involved in the practice of Information Systems are given the opportunity and knowledge to question their own motivations, question the dominant norms and beliefs which influence those motivations, participate in debates on objectives and how to achieve them, participate in debates about the consequences of particular innovations, or policies, and thereby take more informed action. Comment is made on the 'epistemological' mode of thinking within Systems Theory, where knowledge (or boundary construction) is not seen 'as given'. Whilst this is commented upon and seen as useful, the thesis focuses also on the ability for self

reflective pedagogy derived from Social Theory, which focuses on learning as a questioning of social assumptions and constraints on action.

This presents a very different role for the Information Systems specialist. It presents a heightened role in the education and learning function in the discipline of Information Systems: from a focus on data rationalisation with associated expertise and formally 'given' knowledge on *how* to apply technology, to facilitator of learning. The alternative role advocated in the thesis, advocates the need to develop 'critical awareness', which questions meanings and interpretations which is highly self-reflective of personal goals, motivations and assumptions, with a focus on questioning *why* the technology should be applied in a particular manner. It calls for empathy, trust and a sense of social value, between social groupings and the Information Systems specialists: something that was lacking in the empirical case studies.

The thesis builds and justifies such a perspective, grounded in empirical observation, and in theoretical discourse.

INITIAL MOTIVATION FOR THE WORK

This work is the result of a certain uneasiness about Information Systems practice. It has been dominated by approaches for building better information technology applications and justifying 'design' strategies and associated change. The discipline of Information Systems (which should inform the practice) has been dominated by the assumption that good application design principles necessarily means better information; it assumes information can be 'designed' by the application of these principles, and has strong linkage to human tasks, procedures and roles.

Yet the real growth in the use of computers has been in technologies which allow users an expression with information, and where the intervention of the Information Systems specialist is less than sometimes assumed. In the 1980's, PC's were not considered 'real' computing - a bit of an inconvenience to the 'real' work of the Information Systems or Information Technology designer. Yet it became embedded into the mainstream as a result of general popularity. In the 1990's the use of the internet and intranets have been the subject of explosive growth. The internet has a semi-designed technical architecture, but at the information level, it has not been 'designed' by the Information Systems specialist with close reference to control, specific tasks or roles within any one context. Both technologies have problems of security, control, risk and integrity, and they are at the mercy of how they are utilised by the non-Information Systems specialist.

At the same time, the emphasis in the practice of Information Systems has been on getting the designs *correct*, and making the technology 'fit' the goals of the organisation. Thus predominance of application development methods and Information Systems strategy, both of which in different ways are used to conceptualise or justify designed information, delivered by technology. Yet there remain unanswered questions: high expenditure with low added value in many circumstances. This is well documented in the Information Systems literature. Failures are well known (see Hochstrasser & Griffiths 1991; Hochstrasser 1994; Willcocks 1994; Bickerton & Siddiqi 1992; Jayaratna 1990; Lyytinen & Hirschheim 1987), and is the basis for justification more research into better systems analysis and design approaches and better 'strategic alignment' models and better 'planning' (IBM 1981, Ward 1990). Yet

relatively little into the *everyday* usage of information and the potential for innovative uses of information and knowledge development.

It was this uneasiness that generated the current work: that much of the practice of information systems has been focused on 'idealised' views of a 'correct' design at a data level. Yet there seems little focus on the everyday, and informal aspects on information utilisation within the context of these 'correct' designs. Also there has been very little analysis on the 'user' driven technologies, which are increasingly available. Within the discipline of Information Systems, there has been relatively little behavioural analysis which focused on primary motivations of the non-Information Systems specialists in their application of the information technologies; the discipline has not sought to analyse their reasoning processes in attaching value to information in everyday practice and contexts: an important area of investigation because of the heightened opportunities for information exploitation and innovation with information, enabled by the changes in technology.

The uneasiness about the practice (and to some extent the discipline) of Information Systems, was heightened during the course of study, by the realisation of some dominant assumptions: the traditional focus has been on 'engineering' technology and extending such principles to organisations. Techniques used in software development have been applied at the organisation level, and brought with it its own ontological baggage. Thus the practice of Information Systems tends to focus on the information 'design' to the detriment of understanding the subtleties of everyday information utilisation and behaviour. The traditional approach uses methods and techniques derived from natural science, and is commonly assumed to apply in social or human activities. In doing so, it tends to underestimate issues of power, conflict and (sometimes) complexity in which information and technology utilisation plays a fundamental role in modern organisations. Finally, many assumptions in the practice (and sometimes in theory) assume profit maximisation or cost reduction as a central goal, with little awareness or analysis of the socially value laden assumptions, or of the diversity of interests in any one context.

Whilst articulating the initial motivations for the work is easily done with hindsight, it has not always been so clear. It has been a messy and muddy exercise in developing clarity. The initial motivation for the current work, at outset and during its development, was a better understanding of a 'muddy' uneasiness, which has now been substituted by a feeling of a clarity. In that sense the objectives of this study have been achieved, even though in the

course of study, far more other questions have arisen or developed than have been answered. Indeed, the completion of the work has coincided with interest in terms such as 'Knowledge Management', which is in part an expression of the current need for learning and human development in the *everyday* utilisation of technology.

JUSTIFICATION FOR THE RESEARCH

The research contained in this work has been prompted by changes in technology. Increasing accessibility of technology for the purposes of information work has heightened the opportunity for information workers to exploit technology for an increasing variety of tasks. The selection of the technology, selection, adaptation and distribution of information, enabled by technology, has resulted in increasing the opportunities for 'end-users' to apply their own discretion regarding the technology and information that they use. In this sense, some of the functions of the discipline of Information Systems are changing. The emphasis on the roles of the Information Systems specialist are also changing and indeed, some functions of the discipline may be better not to be considered the sole domain of the Information Systems specialist: provision of information and of associated technologies is increasingly at the hands of the non-Information Systems specialist. The relationship between the discipline of Information Systems and its key functions are explored in Jayaratna (1994), who argues that the discipline can be conceptualised in terms of five key functional areas (information strategy, information processing and usability, information management and control, information systems development and education and learning). This is depicted in figure 1.

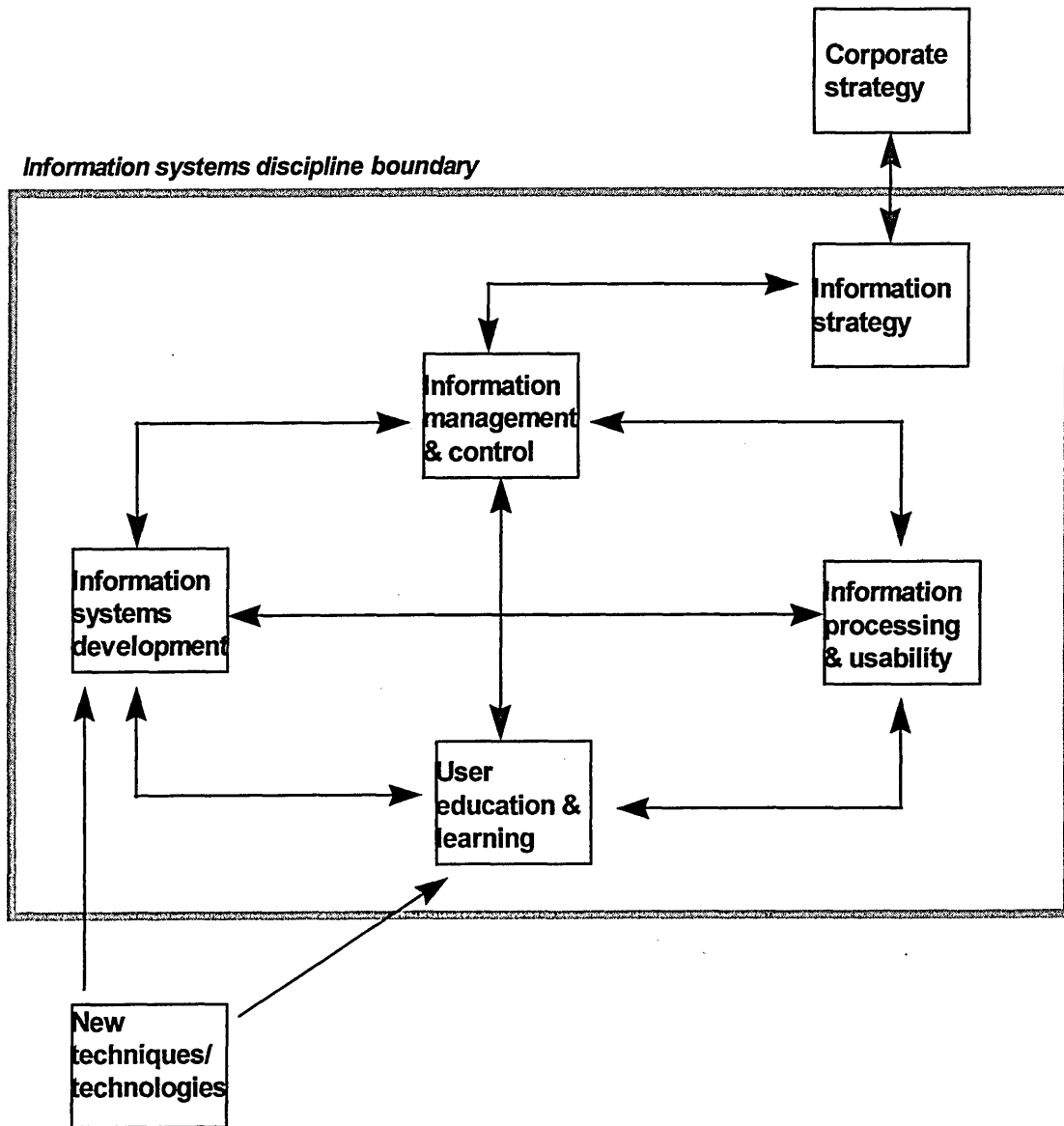


FIGURE 1: THE FIVE FUNCTIONS OF THE DISCIPLINE OF INFORMATION SYSTEMS (ADAPTED FROM JAYARATNA 1994, PP. 9)

HISTORY OF THE DISCIPLINE OF INFORMATION SYSTEMS

The discipline of Information Systems is relatively immature and primarily (still) a technologically driven field of study, legitimised in many areas by the need to produce and design 'better' information technology 'solutions' within the human activity 'systems' in which they appear. Traditionally, the Information Systems discipline, has concentrated its efforts on models of organisations, and methods and tools for developing 'effective' applications. The relative immaturity of the discipline of Information Systems has stimulated discussions of research strategies and the theoretical foundations of the discipline as a whole (see Mumford *et al.*, (1985), Cooper 1988; Orlikowski & Baroudi, 1989; Jenkins 1985, Ciborra 1997, Orlikowski 1990). These debates question the meaning of the discipline, which is seeking an emergent identity. Swanson (1985) argues that the discipline of Information Systems has grown from three associated disciplines: Computer Science, Management Science and Organisation Theory. Although these three disciplines play an important and relevant role in contributing to the discipline of Information Systems today, the origins of the discipline has a unique source. Even disciplines such as Accounting, Information and Librarianship or Statistics which have had a long history of processing information, did not give rise to the formation of the Information Systems discipline as it is known today. Rather, the birth of the discipline of Information Systems owes its origin to the failure of Computer Science to use computers for solving particular application problems both at an individual and an organisational level. In doing this, wider organisation analyses of the information and applications developed. Whilst Computer Science was concerned with the exploration of computer technology, it was the interest in the use of computers for *solving user problems* that gave rise to Information Systems as a discipline. However, today the discipline of Information Systems has recognised the importance of the reference disciplines discussed by Swanson (1985). Yet the technology is changing towards greater *direct* manipulation by the users, without the involvement of the Information Systems specialist, and this raises some key questions (reflected in the objectives of the current work) such as:

- the motivations of information technology users in everyday 'interventions' in perceived information problem solving;
- the question of how *evaluation* of 'end-user' application of technology is undertaken: this is both important at a methodological level, which will impact by informing some aspects of Information Systems practice;

- the changing role of the Information Systems specialist in enabling 'effective' technology *and* information utilisation in circumstances where non-Information Systems specialists *directly* apply technology for information purposes.

In seeking answers to these questions, the thesis contributes to the discipline of Information Systems, by developing a behavioural and motivational analysis. It contributes to practice by presenting a view that sophistication with technology does not imply means better information; rather, it implies that there are greater opportunities to make mistakes. Such mistakes are linked to or derived from social pressures, threatening environments and poor relationships or understandings between social grouping. This in turn implies the requirement to investigate the opportunities for an enhanced role for education and learning in the discipline of Information Systems.

EDUCATION AND LEARNING

The function of education and learning in the discipline of Information Systems has received rather scant attention. Learning about the technology is seen in this thesis *as only a component* of the practice of education and learning in the discipline of Information Systems. In this thesis, it is argued that learning entails the relationship between information, action, decision making and the reflective questioning of motivations; it thus demands the analysis of the learning process at an epistemological level. The issue of learning is seen as particularly important in contexts which demand flexibility, intuition and critical reasoning. It is argued in the thesis that this sits uncomfortably with the dominant 'paradigm' of thinking within the practice of Information Systems as being oriented towards the design and development of 'tasks', 'processes', 'roles', 'organisation structures' (for instance Cutts 1991, Ould 1995), rather than the development of people.

There has been a certain interest in learning, as part of the process of participation in systems development. See for instance Newman 1989; Land 1987; Mumford 1981, 1983; Mumford & Weir 1979; Land and Hirschheim 1983. Such perspectives have focused on *people* and see the role of the Information Systems specialist as an arbitrator, translating participation of the design activity, into the design. In the current work, that arbitration role takes a slightly different role in facilitating greater reflective practice on the manipulation of information (see

Pava 1983). It is suggested that the changes in emphasis brought about by the new technologies have heightened the importance of this aspect within discipline of Information Systems. The function of education and learning is something which is becoming increasingly important, and yet remains a 'poor relation' within the discipline. The discipline has not delved deeply into issues of learning, possibly as a result its focus on application development and associated dominant paradigms of thinking.

THE DOMINANT PARADIGM

There has been a dominant paradigm of thinking reflected in both the practice and the discipline Information Systems, which is derived from application development methods; that following technological design there follows a period of 'user' training. This paradigm remains dominant, and education and learning within the practice of Information Systems and has focused on 'package' training, with the central objective being on technology (rather than information) exploitation. There has been the general assumption that training in packages, necessarily brings with it 'better' information. Generally, it has been oriented towards training which is limited in scope as its motivations are around 'user acceptance' with the goal of enhancing technology exploitation. This is evidenced in the wide variety of training programmes which emphasise technology exploitation which *assume* effective information exploitation.

Yet there has been little focus on *Information Management*. As 'users' become increasingly aware of the capabilities of the technology at their disposal, and that the variety and form of that technology is increasingly accessible, it follows that 'users' are also able to articulate the value of the technology that they use as an information tool in meeting a variety of personal and organisational objectives. Yet the users themselves are subject to a series of social constraints on their thinking and action, with regard to their assumptions of what makes effective information. Given the technological trend, it is important to investigate such constraints. The investigation of such constraints, and associated epistemological issues, form the bulk of this work.

OBJECTIVES OF THE RESEARCH

The justification of the need for research and the clarity of understanding as described, has focused on some key objectives. The objectives, in broad terms, are to focus on the underlying principles and *behavioural* characteristics of non-Information Systems practitioners in their *everyday* application of technology. As discussed, the thesis specifically focuses on the following:

- the motivations of information technology users in everyday ‘interventions’ in perceived information problem solving;
- the question of how *evaluation* of ‘end-user’ application of technology is undertaken: this is both important at a methodological level, which will impact by informing some aspects of Information Systems practice;
- the changing role of the Information Systems specialist in enabling ‘effective’ technology *and* information utilisation in circumstances where non-Information Systems specialists *directly* apply technology for information purposes.

HOW THE OBJECTIVES WERE ACHIEVED

The field work contained in this work consists of four major component studies, each contributing in different ways towards the development of the argument and theoretical position. Each component of the study is based around a different theme, which was investigated, and contributed to the writers own learning. Each of these justify the epistemological perspectives taken in the work. These are introduced below.

FORMAL VS INFORMAL INFORMATION

The field work in this section demonstrates that formal application of technology has certain constraints as an information tool. This is precisely where most of the effort in the discipline and practice of Information Systems has been placed. The field work in this section is based on a number of interviews of users of CSCW technology and a questionnaire which focused on the informational sources preferred by decision makers. The combination of field work and theory on the utilisation of information, confirmed the notion that formal mechanisms orient themselves to formal hierarchy and assumed power structures in organisational form, and to the *control* of certain key and (often) well understood objectives. However, this does not necessarily meet with other personal or organisational objectives, or even meet the 'users' own preferred methods or approaches to work. Thus it does not reflect actual (rather than assumed) power structures, nor the everyday activities that make up work.

This suggested that when dealing with anything other than the formal and (relatively) simple control tasks, dealing with the subjective constructions of those involved is fundamentally important: it is important to get into the phenomenological world of the 'user' in order to investigate the informal uses of information. The field work also pointed to a certain limitation in the orientation of some of the functional activities of the Information Systems Specialist which tended to focus on the formal information requirements, and (largely) ignoring the informal. It is argued in the thesis that the 'informal' (or 'tacit') has a particular role to play in the overall provision of information in most organisations; it can provide flexibility, can be directly controlled informally by individuals within the organisation, can be

changed and adapted directly by the 'information consumers', and can be as important (if not more so) as the formal data. The dominant 'paradigm' within the Information Systems is that of formal data rationalisation. This is a key and important issue, but tends to dominate the discipline of Information Systems and therefore the everyday practice of Information Systems. It is thus not conducive to developing *innovation* with information. These concepts are articulated in Kawalek 1994, Kawalek 1996, Kawalek, *et al* 1997c, Kawalek *et al* 1998a.

TASK AND 'PROCESS'

The ideas articulated (above) started the crystallisation of the theme of a dominant 'paradigm' of thinking within the discipline of Information Systems. Thus it became important to focus on a wide variety of tasks and the applications developed by the everyday work activities of the information workers. This was achieved by a second questionnaire and two focus groups. The result of this section of the study argues that the dominant 'paradigm' of focusing analysis on structured tasks using a set of techniques has *less than expected* relevance for analysing the wide and varied user applications, which are informal, 'ad-hoc' and reactive to everyday events. Techniques to focus on tasks, roles and activities, within 'process' units of work, gives little analytical advantage in explaining where technology should be applied by the 'end user' for many information purposes. The focus on task and process has been dominant in both the practice and the discipline of Information Systems, and again is derived from notions of 'control' and 'rationalisation'. This has been a dominant area of analysis in structured systems analysis. Such tools and techniques for analysing task, process and control are not invalid however, but (as argued in this work), should be used as learning devices, rather than only for 'specification' of alternative (and formalised) work activities. In this way the analysis of end user applications must move beyond traditional systems analysis 'paradigms' of thinking, towards learning. Thus the dominant paradigm of 'specification' gives way to the techniques depicting information and workflow analysis as only a component of learning, both on the part of the Information Systems Specialist, and on the part of the user. This is articulated in Kawalek 1996, Kawalek *et al* 1997d.

INFORMATION AND FORMAL TECHNOLOGY APPLICATION

The analysis was developed to incorporate the relationship between formal application of technology for control and the weaknesses such technology application has as a flexible *information* tool. It is often asserted that technology application can be effective for both control *and* for information innovation. The final case that is developed in chapter 3 is interesting to the current work in that it demonstrates a certain conflict between the Information Systems specialist who focuses on the formal, and the users of the technology, whose focus is on the informal. This is seen as partly a result of the dominant paradigm of thinking in the practice of Information Systems as primarily involved in construction of applications - which are seen as 'right' by the process of construction, and are justified by the expertise involved in that construction. On-going consultation and learning on the part of the Information Systems specialist is seen to compromise their legitimacy as an 'expert'; learning by the 'end-user', and reflection on their own information requirements, is seen as rather 'woolly' and un-productive. The heuristically powerful tools of hard systems analysis are seen as seductive: 'soft' learning, reflection and questioning is seen as less productive.

In the case study, user application of technology occurs precisely because of the limitations of other 'formal' technology to provide the flexibility and control over data which there is a perceived requirement. It does not mean however, that the 'perceived requirement' is a 'correct' requirement. This provides a second strand of a learning agenda - the ability for the Information Systems Specialist to facilitate the 'user' in evaluating his/her own information need, given the constraints of the current technology implemented within the context. Yet barriers to learning are seen largely as questions a dominant assumption that systems work involves 'specification' rather than learning, which is in some way linked to a set of ontological assumptions. The conflict is in defining 'correct' system applications rather than on learning and questioning of meaning. The case study and conclusions are articulated in Kawalek 1996.

POWER, CONFLICT AND 'USER' INNOVATION

The final case study is seen as bringing many of the themes previously described together. This is a more substantive piece of empirical work, developed over a two year period. It uses

the a modified form of 'analytical induction' to guide its development. It is an interesting case study because there was substantive 'strategic' change of the formal information and systems infrastructure that was occurring: this was a corporate strategic change, which had the objectives of re-organising formal information provision to gain some sort of benefit from global economies of scale. In the process of the change, the roles, actions and the (informal) user motivations were analysed. The link between the informal applications of technology and motivations were analysed in some detail, over a long period. The conflicts between the Information Systems practice within the organisation, and the perceived needs and problems of the 'end-user', and how the end-user reacted against the formal and 'rationalised' change that was occurring resulted in classification of motivations within the context. The classification (called 'orientations') generated suggested that the information application was limited by narrow motivations, which calls for a need for better information learning and facilitation. The facilitation had to be an approach which did not try to impose alternative rationalised approaches, but one in which the user could be reflective of the limitations. This was seen as a particular form of a pedagogic process which seeks to develop trust and understanding, rather than impose a correct solution. The themes are articulated in Kawalek 1997, Kawalek & Johnson 1998, Kawalek & Hackney 1998d.

The 'orientations' presented in section three, is not meant to be an all-encompassing framework. Rather, a small contribution to a complex discipline. It is also seen as a theoretical framework, which is pragmatic in the everyday terms in Information Systems practice.

OVERVIEW OF RESEARCH FINDINGS

The initial research focused on the reasons for the trend towards end-user computing. The assumption was that it can enhance flexibility. This is perhaps an obvious point, but is an increasingly important one given the current trend in managerial thinking which emphasises the need for flexibility. That is not to say that the demands for flexibility are appropriate in all contexts, nor are they socially value free. However information systems which are directly manipulated by the 'users', without the intervention or design which involves the Information Systems specialist can, and sometimes does increase flexibility, new thinking and innovation with information technology.

However, as demonstrated in the empirical work, this is *often* not achieved.

I. GOALS ARE OFTEN NOT ACHIEVED

Initial research findings suggested that in trying to achieve such flexibility or innovation, the objectives of the application are most commonly not met or are significantly limited. Findings suggested that exploitation of technology at the 'end-user' level *can* be used to increase throughput in a given area of work, or to enable increased (personal or wider) control, or to enhance product or service. However, many applications could only be seen 'efficiency' gains only, and are primarily motivated by personal or narrowly defined sectional gain, often couched in language of wider 'organisational effectiveness'. Yet they remain very limited views on 'effectiveness' and often have multiple or fuzzy objectives in the application of the technology used. Certain objectives are justified by limited visions around which the rationalised 'justification' occurs.

By focusing on the motivations and the limitations of user views, it is not surprising that the *ascribed* goals are often not achieved. By delving deep into the application contexts, and the motivations behind them the research revealed a certain level of personal self interest, even to the point of organisational subterfuge.

II. TECHNOLOGY SKILL IS LIMITED, BUT ALSO INFORMATION SKILL IS LIMITED

To explain the above, the research focused on some of the more fundamental assumptions and motivations of technology users. Whilst skill with technology is a problem and barrier to effective utilisation, perceptions of information need at any one moment in time also presents a key difficulty. These perceptions have been found to be constrained by changes in the context, and changes to perceived roles, tasks and structures within the context. By using an inductive approach in developing the empirical work, the exploration of the assumptions and motivations of the users gives a higher level analysis which indicate a set of 'basic beliefs and motivations'. These are as follows, and are termed 'orientations'.

1. Realist - refers to one who assert procedures, tasks and activities are 'correct' and that their application(s) which support tasks and activities are justified on a set of rationalised criteria, based on 'correct' assumptions. The term 'realist' is used because by assuming the 'correctness', the application of technology is seen as unquestioning of associated tasks and activities. The assumption that they are 'correct' reinforces a certain 'reality' construction, and thereby reinforcing organisation power and structures. Why it is 'correct' is that it reflects those dominant social norms of the context. However, it does not necessarily mean that there are alternatives, but that they are not investigated, nor are a range of associated assumptions questioned.
2. Frustrated realist. This category indicates the way end users often have a set of perceived information needs, but are not catered for by existing information sources (delivered by technology or otherwise). The primary motivation is a 'frustration' with existing data sources. This does not imply that their own applications are 'correct' or 'effective', or that their frustrations are 'justified' in the first place. However the application of technology directly, is seen as a 'reaction' to existing information provision within the context, and 'correct solutions' are seen as practical reactions to perceived 'poverty' of existing information resources. However the 'solution' is also not seen as 'right': rather they are seen as 'right in the circumstance', and are derived and justified by this 'frustration'.
3. Doubter - describes one who questions the motivations of associated procedures, tasks and activities; the application of technology is seen as necessary because of the dominant beliefs of others in the context; it has to be done, though it is not necessarily *better* because there are

other, more serious issues which are not being addressed. In the empirical work, the characteristics of such an orientation suggested that even the application of their own technology is seen as unlikely (in the circumstance) to be particularly effective.

4. Defender describes an orientation as one who sees the technology application or resulting information processing as a social defence; the primary motivation is (commonly) to develop technical or information skills which are indisposable, or applications which are equally indisposable. Thereby heightening self-importance and therefore the social defences against perceived threats.

These are conceptual categories which can be used heuristically. The research shows that individuals frequently move from one category to another, which is dependent on their political allegiances and personal motivations at any one moment in time. The research applies these conceptual categories in a variety of situations, and to a variety of technologies in order to gauge the general applicability and heuristic value.

In this way, the thesis demonstrates that the objectives which dictate the exploitation of technology at the 'user' level are based on narrow and varying 'user' cognitions, which are contextually constrained. By exploring these constraints, they can then be used by the information systems specialist as a way to help 'liberate' or question the cognitions of individual users. Thus the practice of Information Systems at the Education and Learning functional level, it is argued, needs to be *much more* than focused at the hardware and software level: rather it needs to include the development of self-awareness of the limited cognitions of individual users to impact on information, and be fundamentally aware of the need to question assumptions being made, and of the 'liberation' process inherent in the learning activity. This moves the role of the Information Systems specialist in the education and learning function away from 'training on technology', but to one of challenger, facilitator and liberator of thinking on the part of the user, in order to enhance knowledge. This role is an important research question in the discipline of Information Systems because of the trend which gives technology to the user, by-passing the intervention of the Information Systems specialist as a designer (or 'rationaliser') of data, which assumes a particular set of tasks and roles. Assuming this is a trend which is set to continue, the role of education and learning is also one which is likely to develop in importance. The categories or 'orientations' described can be used as a basic heuristic to enable the 'facilitator' role with the function of education and learning within the discipline of Information Systems. More importantly perhaps, the

construction and justification of the 'orientations' are used in this work to demonstrate the limited nature of Information Management learning and critical reasoning in the practice of Information Systems.

However the role of learning is not meant to be 'the answer' in a simplistic way. By focusing on the 'social constraints' in the context, it follows that such factors are fundamentally important in the reality construction (and thus motivation) behind an application of technology. There are many issues which will change *only* if the social context also changes. For instance, by utilising Structuration Theory, the research demonstrates that some of the 'defensive' actions are behavioural responses certain aspects of social structure which can be seen to protect certain insecurities. In this way, only by changing these social contexts (for example by developing a greater level of trust), will changes in behaviour be achievable. However, learning is seen as the key to developing that level of awareness in those involved in the practice of Information Systems. Furthermore, by focusing in on learning, the imposition of over simplistic prescriptions of perceived solutions can be avoided. The solutions can then come from the phenomenological reality constructions of those directly involved, which are challenged by the critical learning process itself.

III. STRATEGIC OBJECTIVES AND THE ROUTE TO ACHIEVING THEM

Yet there are further findings and issues raised in the research. There has been found to be limited awareness of organisation direction or how goals might be achieved. This is reflected into the application of technology. Without critical thinking about direction and policy implementations, innovations with technology cannot be anything more than 'ad-hoc' reactions to circumstances. This issue is not seen as being helped by the preponderance the Education and Learning function in the discipline of Information Systems as being associated with 'teaching the technology': it is not seen as sharing a particular vision or a questioning on how to achieve an objective, with implications and links to information utilisation.

IV. MOMENTS OF KNOWLEDGE ABOUT INFORMATION

The function of Education and Learning in the discipline of Information Systems, is again of limited by its own 'dominant paradigm' of learning and pedagogy. However, it is suggested that an alternative for information be utilised. The thesis focuses on the two 'moments' of knowledge derived from Freire & Shor (1987): that knowledge that is imparted by the teacher as 'facts' or known knowledge. This is the traditional view of the Information Systems Specialist involved in the functional area of Education and Learning. The second moment is that of 'discovery' where there exists "...*action, critical reflection, curiosity, demanding inquiry, uneasiness, uncertainty - all of these are indispensable to the cognitive subject, to the person who learns!*" (Freire & Shor (1987, p.8)). It is in the sharing and critical reasoning about visions and motivations which can enhance the process of discovery on the part of the user (or 'subject') which is part of the shift in the role of the Information Systems specialist involved in the education and learning function. The role shift is from imparting 'factual' or known knowledge (usually about technology) to facilitating critical self reflective reasoning on the impact, motivations for and opportunities of information utilisation, along with the social constraints which help determine the goals.

IV. ARGUMENTS FOR A CHANGE IN INFORMATION SYSTEMS SPECIALISTS' CONCEPTUAL REASONING

In developing the argument for a shift in 'moments' of learning, the argument is developed that there needs to be a change in the Education and Learning function of the Information Systems Specialist. This is argued on the basis that, as the trend towards powerful and accessible technologies continues, there is a continued requirement to expand information support. This moves the conceptual reasoning of the Information Systems specialist away from technology, towards:

- i. business strategic objectives and the social processes contained therein;
- ii. structural, political and social constraints that the 'user' of technology faces in everyday utilisation of technology when expressing information or technology 'need'; and
- iii. towards greater abilities of utilisation of Systems thinking in epistemological mode, which enables critical and reflective questioning of boundaries with the ultimate objective of questioning inherent functions within the boundaries;

- iv. Focus on the process inherent in pedagogy from the first moment, to a recognition of the second moment.

It is not to say that the Education and Learning function is to coax the user into a *unitary* vision of organisation, of information utilisation or on technology utilisation. It is to educate and 'liberate' thinking on the part of the user, to encourage greater self awareness of underlying motivations. This takes particular types of skill on the part of the Information Systems Specialist, not least because of the recognition of *pluralism* in organisation: this is something of a shift because of the dominant 'unitarist' paradigm of thinking within the *practice* of Information Systems, which focuses on the rationalisation of data across organisation sub units. The points (above) are further expanded in philosophical terms below.

POINTS OF PHILOSOPHICAL UNDERPINNING

There is evidence in the thesis to show that the vision of the technology user is limited in a variety of ways. Generally, the vision is developed around a discrete boundary or culture of the department or section within any one organisation. But this tends to be seen (in practice rather than at a theoretical level) to be a process of communication (usually described as top to bottom (organisationally)). Furthermore, the discipline of Information Systems tends to be dominated by such hierarchical notions, and is rather 'classical'. For instance information strategy tends to be the domain of the Information Specialist; it is formulated and created, and then implemented (top to bottom). Or that information is gathered at the bottom (operational information) and is summarised for use at the top. This linear model is appropriate for the *formal* aspects of data rationalisation, and associated analysis of tasks, roles, and enterprise wide 'processes', or for strategy or policy implementation. This 'paradigm' of thinking assumes a degree of rationalism, but does not necessarily reflect exactly what really happens in the everyday utilisation of information, which is used as a source of power, innovation or learning. In that sense, the hierarchical model represents a common assumption on the part of the Information Systems specialist, and in a behavioural analysis, is not necessarily applicable or important. It results in a limitation to the attention being paid to the need to promote innovation, learning and reflection because it assumes an overly rational use of information.

If responsibility is given to individuals (sometimes termed ‘empowerment’) with powerful technologies then, as already explored, there is a question regarding the ‘constraints’ of social structure on action. In the current work, it is seen as fundamental to the analysis of the everyday exploitation of technology: that exploitation is not ‘right’ or ‘rational’ in an absolute sense, but is rationalisable when exploring the application in conjunction with contextual aspects of social and organisation structures in which they are placed. Such structures are seen as conceptual structures, with no physical attributes, but can constrain the thinking (on the part of the ‘user’) regarding key objectives. As such, whilst ‘structure’ and ‘boundaries’ do not have physical characteristics, they can cause physical change in human behaviour and activities. At an epistemological level, it is argued that structure and boundaries can only be investigated in terms of human construction of these: it is not to say that structure and boundaries do not exist, but that human conception and use of structures are wide and variable. Thus suitable method is required, both at the level of research, and for the *practice* of the education and learning function within the discipline of Information Systems. This is a key epistemological point to aid the education and learning function, and the associated support of the Information Systems specialist.

Social structure is not the same as ‘boundaries’ in Systems Theory. Using Systems Theory as an underpinning discipline for the study of Information Systems has (arguably) been a dominant approach. Yet many studies within the area, use Systems Theory in ontological mode - ie where systems boundaries are not questioned. Yet there is commonly a limited vision of alternative or new ways of organising human activity ‘systems’; this results in a limited vision of the opportunities afforded by the increasing accessibility of new technology. This is particularly so with regard to communications technology which supports information transfer across traditional or ‘given’ ‘boundaries’. However, without analysing the systems boundaries, this results in technology exploitation which changes very little of the work context and results in ‘automating’ aspects of activity which does not question fundamentally the ‘systems’ (boundaries and structures) around which human activity revolves. Change is a conceptual issue and one of epistemology which may have important implication for the way work is achieved, and is a conceptual issue for the discipline of Information Systems, particularly in the function of Education and Learning.

The thesis explores the relationship between social ‘structure’ and ‘systems boundaries’ as limitations on conceptual reasoning. It argues that the function of education and learning

within the discipline of Information Systems, be questioning of the social structure and boundaries which has a determining effect on the perceived information needs of its users. Further, that education and learning can also use Systems Theory in 'epistemological mode', to question given boundaries. Thus the function of Education and Learning within the discipline of Information Systems, becomes one of facilitation and 'liberation' from the conceptual limitations on perceived information need, (and associated technical application), that social structure and systems boundaries can impose.

STRUCTURE OF THE THESIS

SECTION 1 : THE DOMAIN OF STUDY AND RESEARCH APPROACH

The thesis is organised into three sections. The first outlines the current debates in the discipline of information systems, and embarks on the epistemological debate around the discipline. Chapter 1 defines the terminologies used in the thesis, and reviews some of the key literature which are seen as central to the current work. The nature of the area of investigation is in fact quite broad, and this results in an approach which can bring together a number of key themes which continue to emerge in the (rather eclectic) Information Systems discipline. The on-going debate regarding qualitative research method (see Denzin 1994) is seen as central importance to the current work as well as study within the discipline of Information Systems more generally. In the current work, the approach has been to take Grounded Theory (Glaser & Strauss 1967, Strauss & Corbin 1990, 1994). However, this approach has not been taken without developing certain critical comments on the validity of the approach, and as such a particular adapted inductive approach is taken (Bloor 1976, 1978). The reasons for taking such an approach is articulated in chapter 2.

SECTION 2: DIMENSION DEVELOPMENT

Section 2 represents a reflection on the building of categories and dimensions for the area of study. This is part of the adapted inductive method as articulated in chapter 2. It does this by on-going reflection of the usefulness of different frameworks and epistemological assumptions which are well known in the field of information Systems, and relating these to the questions of end-user technology application as described above. There are three key pieces of empirical work that were used to verify and conceptualise such issues. Each of these are described, and represents the early 'dimension-building', and justifying the perspectives taken in the work, largely at the epistemological level, for organisationally based research into the end-user application of technology. The objectives of section 2 are to seek out the 'categories' and 'dimensions': it is not necessarily to prove a particular perspective,

but to reflect on the epistemological and theoretical constructions inherent in other studies and work.

The final chapter in section 2 represents a theoretical deconstruction of the dominant 'paradigm' of thought which pervades the Information Systems literature. It argues that the discipline of Information Systems has focused on the rationalisation of data at a strategic and operational levels, and has developed a dominant epistemological paradigm of thinking. The dangers of this are explored at a general philosophical level for the discipline as whole and with particular reference to the education and learning function within the discipline.

SECTION 3: CASE STUDY

Section 3 takes the themes developed in the previous chapters and, as part of the inductive approach taken, articulates the key findings in the substantive case study. The case study provided, represents the central data upon which the theoretical frameworks presented in the thesis, are further developed and verified. The case demonstrates the limited vision of end users of technology reacting and interacting with the data rationalisation process which was being undertaken in the case study. It demonstrates the utility of a subjective ontological *and* epistemological position at the research level. More fundamentally perhaps, it demonstrated in practical terms the need recognising the conflict of interest, and in the reactionary and defensive thinking on the part of users. Yet, this presents what is termed a 'normative' view in that accommodation of disparate views can be overcome (or made 'normal'). The case study utilises Structuration Theory (Giddens 1984). The section argues that previous work that has used such an approach (for example Walsham 1993a) does not consider the fundamental roots of Structuration, and demonstrates that such a (normative) view is limited because of the nature and insecurities of employment practice, which is both a societal and an organisational issue. Thus at the practical level, normative approaches at an organisation level inevitably have certain limitations because conflict resolution is inherently rooted in wider social insecurities. This is articulated in chapter 6. Findings are verified as described in the research method used by using data from a further short case, which is seen as much more deductive in reasoning process.

THEORY CONSTRUCTION

The generalisability of the perspective presented, is inherent in the theory, which is derived from, but yet sits above, the everyday practice. In this manner, discussion on the relative merits and the generalisability of the theory developed, is done in the final chapter. The theory presented articulates the need for a greater level of empathy, trust and learning, which explores the inherent motivations of users in their application of technology. It recognises social and organisational conflicts of interest in explaining user application of technology, which is 'rationalised' against limited criteria, but justified as an 'organisational' need. Yet the more *fundamental* behaviours can only be explained in a generalisable way by reference to limited visions of need in which contextual and structural lines of authority and power play a important role. These are both formal and informal power and structural issues; only by the process of learning and development of trust at the individual level, can greater vision and innovation be accomplished.

REFLECTIVE OVERVIEW

The thesis is not seen as a prescriptive set of notions to be adhered to in every organisation context. Rather, it is more an offering stemming from experience, empirical observation and theory which has culminated in a focused study of which the thesis is only one output. Studies which attempt to align the interpret the information environment of information workers, which recognises the everyday complexity of the context, and the technologies which (supposedly) support that information environment are (so far) limited and rare. Most are oriented towards building 'better' applications in a 'top down' fashion - starting with strategy formulation followed by application development. It is in this area in which it is asserted that this thesis makes a unique contribution to knowledge. As is often the case, its relative merits will be judged by time rather than by any one reading, and in the learning (primarily on the part of the author) which is its principal output. The gauge of a qualitative study such as this can only be in its grounding in reality by its empirical excursions and appropriate scientific method, and it is these validate or otherwise the perspectives presented. The development of the work has been an iterative process of considering theoretical perspectives and ideas, and at the same time referring to primary and secondary interpretations of events and issues embedded by empirical observation. Indeed the

maturation of what now seems a simplistic set of ideas at the outset, derived from ten years working in the field prior to embarking on the work, has enabled a far more in-depth account of key issues. This process has not been singularly inductive nor deductive: rather an iterative questioning of assumptions and ideas, and thus in itself contributing something to the methodological debates in research. The key focus has been on information provision within context with an iterative evaluation of dominant assumptions made in the practice and in the discipline of Information Systems. Research method for data capture and analysis has been an on-going concern, as well as underpinning (ontological) assumptions. Questionnaire analysis, sets of small case studies and focus groups have been the principal instruments for the 'dimension building' phase, and a more in-depth case study for the main analysis, with the application of Structuration Theory. The data has enabled insight into the information environment, technology application and use. The role of each of the research instruments has been complimentary in many ways, each of which builds perspective and depth in its analysis. The questionnaires provided insights which were general in nature, and there were some surprises that the data revealed. The case studies enabled qualitative and in-depth analysis. These enabled a focused insight into the complexity of information context and the changing need of end-users. Such variables are now seen as key factors in determining the applicability or non-applicability of traditional information technology provision. However, the linearity of the research process is easily described with hindsight. It seems easy to write an account which seems rather planned and straight forward in the development of themes and key conclusions. In fact, the research undertaken for this thesis has been far from linear. The domain of investigation has been one of synthesis of many disciplines, and an exhausting meaning/understanding pilgrimage. It has been quite a grounded piece of research, and the on-going empirical studies have been used to verify the sometimes quite inductive construction of ideas and themes. Yet it is recognised that the work is quite eclectic. This is seen as both strength and weakness. A reflective account of the strengths and weaknesses are developed in chapter 7.

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CHAPTER 1

INFORMATION, SYSTEMS AND APPLICATION DEVELOPMENT DOMAINS: DEFINITIONS, TERMINOLOGIES AND REFLECTIVE ASSUMPTIONS

Practitioners of everyday life are not "organisation dopes", mere extensions of organisation thinking. They exercise interpretive discretion, mediated by complex layers of interpretive influence. They also carry with them the biographical basis for resistance, personal and interpersonal histories that compete with organisational categories as means for interpreting experience.

James Holstein & Jaber Gubrium, 1994, pp. 268

INTRODUCTION

In September 1992 the Department of Trade and Industry (DTI) in the UK embarked on a call for research in what became known as 'User Enhanceable Systems'. It was initiated by the increasing recognition that end-users of technology were increasingly being able to 'enhance' their own technologies and software tools, (and by implication their own information environments). See IOPener 1992. It was seen as an initiative to enable better explanation of the trend, its dangers, contexts and to establish theoretical underpinning and understanding. It also reflected the increasing recognition that information technology applications were increasingly required to be more flexible to meet everyday organisational and human need. The early vision of what this type of research entailed was limited to a set of quite simplistic assertions. Why the trend of 'end user' computing gathering pace? Is there any benefit from it? Are there certain organisation contexts where it is best encouraged? What is the relationship between it and traditional application development? Is it a result of centralised Information Technology provision failure? Are uncoordinated actions by 'end users' producing disparate, inappropriate applications which are flawed or otherwise? What are the skills necessary to help better utilisation of such technology? Can the discipline of

Information Systems rationalise the trend against some sort of strategic vision of where a particular organisation is, or wants to be, in terms of its Information Technology usage?

This thesis aims at answering some of these questions by developing an analysis and theoretical underpinning for the study of this trend; in doing this, this thesis brings insight into the failings of some of the traditional assumptions in the practice of Information Systems. Whilst at the start, the study was expected to focus on an evaluation of technology as implicated in the original DTI call, it was quickly realised that it could only be done by focusing attention on the information that was being processed, the contexts and human motivations to which technology was being applied. The work thus evolved and matured into an Information Systems or Information Management study, rather than being focused on Information Technology. This is based on the premise that technology is impotent unless it can deliver information. Of course the word 'information' is a multi-faceted and emotive term, often associated aspects of organisation contexts such as control, co-ordination, decision making, power etc. Even the most simple application of Information Technology is useless unless it has some form of information purpose. The thesis seeks explanation by focusing on the structure of work and activity of human beings in the work place, and the relationship of that activity and the role information (and thus the application of technology) within the context. One of the key findings was that end-user applications could be seen as a 'reaction' to some of the formal applications of technology, which was perceived as in some way lacking as an information tool, and thus the work also makes critical evaluation of the practice and techniques of Information Systems specialists.

Thus the *raison d'être* of the current work is to focus on a number of key issues stemming from the DTI initiative. It is contribution towards an understanding of the reasons for the explosive growth of technologies oriented towards direct user application and manipulation of data. Different trends in the information technologies (for example PC applications, inter and intra-net usage) perform information tasks which are usually outside the 'design' function performed by the Information Systems specialist. Many user initiatives also sit outside the strategic function because, by its nature, it is at the mercy of the discretion and motivations of the user. Whilst Information Systems strategy may dictate policy and vision because of its 'high level' view, it cannot be precise about *how* the technology is to be applied in everyday affairs. The everyday management of the information and processing function, must therefore use alternate approaches for ensuring information quality, standards and

behaviour in practice: research may reflect this by employing scientific approaches borrowed from disciplines such as Sociology in order to ground and validate its assertions.

Thus the work presents a perspective which (hopefully) contributes in some small way to the gathering momentum and recognition of the need for, better understanding of the management issues surrounding the information technologies. By investigating the meaning and importance of these trends it has been required to venture into a wide variety of disciplines. It has been a process of study of some breadth, synthesising and interpreting many areas. Of course, this breadth has implications for scientific method and has taken a sort of wide synthesis of theory and qualitative data (described as 'category 1' research by Ramenyi & Williams 1995). Verification of the on-going development of ideas and theoretical constructs have necessitated interpreting human attitudes and events, using a grounded type approach (Glaser & Strauss 1967, Strauss & Corbin 1990). However, comment is also made on the limitations of such an approach for the current area of investigation. The eclectic nature of this work is seen as its key strength, and has allowed a creative questioning of some of the traditional assumptions of Information Systems practitioners (specialists and non-specialists) and some of the common assumptions held of the discipline.

The work has been a highly enriching experience, which has been characterised by numerous iterations both in terms of empirical observation, and relating those observations within social science, managerial, organisational, and systems literature. Because the work reflects the changing technology, away from traditional data processing and central data base provision, controlled and programmed by the Information Systems specialist, the scientific approach to research has also needed to shift. Objects provide new 'tools' for application at the end-user level; common interfaces has made suites of software, previously relatively inaccessible much more available to be manipulated directly at the hands 'non-specialist'; the growth in the awareness of the technology has resulted in increased accessibility; groupware products has enabled the non specialist to determine and evaluate their own needs at a technical and information level; information itself is more accessible and global. Yet despite these trends, the practice of Information Systems has been found to be making traditional assumptions about its role in 'rationalising' data, and providing hardware and software education and training. The traditional approaches in Information Systems practice have focused attention on the user interaction with a specifically *designed* (fit for purpose) data source at its heart: these assumptions can be detrimental to supporting the development of

people who are applying technology, which is enhanced and adapted directly by staff who see themselves as specialists in fields other than Information Systems. Thus the thesis is critical of the dominance of some of these assumptions, evidenced in both scientific approach and in functional aspects of the practice of Information Systems, and this has some important implications for the discipline.

The rest of the current chapter is to help clarify terms and concepts which are subsequently used in the thesis.

COMPUTER TECHNOLOGY, INFORMATION SYSTEMS

Firstly the terms 'information technology' and 'information systems' and 'systems' are terms that require clarification. Sometimes these are thought of synonymously. In this work, the term 'information technology' is seen as the devices, hardware and software which make up one of a number of media's for data storage, transfer and processing. It is seen as one of many media's which can enable data manipulation and access for human meaning attachment (Checkland & Scholes 1990, ch 2), and is seen as a component of the 'information environment' in which humans operate their lives. The word 'systems' is seen as originating to describe a 'holistic' view of phenomena, around which boundaries can be drawn with the properties of *hierarchy*, *control*, *emergence* and *communication* (Checkland 1981, p. 317). The legitimacy of these boundaries are key to systems thinking, and is an approach to scientific investigation.

The term 'information' is a commodity which can be used in a variety of ways, often enabling better or more informed decision making and as a material for knowledge creation. It also plays a key role in the job tasks, activities, politics and culture of everyday organisational activity. It contrasts with the context free nature of 'data' which is seen as the raw material for information. As a consequence of this type of definition of these terms a computing or information system involves data manipulation and interpreting meaning from data, and the 'information design' function of the Information Systems discipline requires understanding of intended uses of information. This is neatly articulated in Checkland & Scholes 1990, p. 55.

'... if we wish to create an 'information system' in the exact sense of the word, we must first understand how the people in the situation conceptualise their world.'

However 'computer design' may not involve 'information design'. Furthermore an information system is not a computer, but a computer system may be one component of an information system. Commonly computers have been seen as a 'formal' component of an information system (Land 1986, 1992; Earl & Hopwood, 1987). However, computers are increasingly used for informal information systems also.

Information systems have an impact on the decision making activities of humans. However to see information as *only* an aid to decision making, underestimates its *everyday* importance played by information in such areas as formal and informal power, and in defining and re-defining structure within organisations. See also Ehn 1988. To see information as an aid to decision making (as in some of the Decision Support literature) is in fact to take a very narrow view (see Adam 1997). This is a very 'rational' view of the uses of information, which under emphasises its role in a complex social milieu, in which information is used to *justify* decisions and actions; furthermore, decisions are not necessarily based on a rational analysis of information. They are made in a highly *ad-hoc* manner, which is reactive to everyday complexity (see Slack and Cooke 1991). Furthermore, as argued in this thesis, information and the associated decisions and actions are not socially value free. They reflect dominant social beliefs, norms and values, and can have wide ranging effect.

TRANSACTION BASED APPLICATIONS

Whilst discussing these key terms and ideas, it seems important that a theoretical distinction is also drawn between the application of technology for transaction handling, and that applied to information. It might be suggested that technology application in the early days was oriented to the transaction handling of various but fundamentally simple business functions. As an example, a typical application might have been payroll. The transaction handling activities associated with the printing of pay cheques was the primary goal of the application of technology, with data variables such as number of hours worked, rate of pay, details of overtime and bonuses being variable data elements to the more static data such as employee name, tax code etc. The algorithms developed as a result were highly computational and routine. The focus of such an application was not on management information, though when taken together, transactions could be further computed and analysed to service some sort of perceived need for information. The primary informational

output was on the pay cheque. Yet the motivation was in speedier handling of transactions, rather than changing the way the information components were used. The primary goal of 'transaction' handling applications of computing technologies, was not to provide information to support operational decision making. The application of technology was primarily used for the handling of simple transactions which *potentially* could be used for information. It was oriented to some sort of *efficiency* gain, making impact by increasing the speed at which cheques were produced, and thereby reducing labour inputs. There are two points that need to be raised here. Firstly, that even such simple applications cannot be seen as socially 'objective': they remain socially value laden. They were designed to meet some sort of social objective, such as 'profit maximisation', 'efficiency' with implicit assumptions about 'reducing workforce' etc. No matter how small the application, the application of technology, being the product of social endeavour, must have social values associated with it. Secondly, that 'transaction' applications were extended to having increasing managerial information as a result of their implementation: they became integrated into wider accounting and operational activities. These simple applications became fundamentally more integrated on working method and, implicitly, a wider variety of information consumers. New techniques and approaches for this additional complexity have emerged.

AUTOMATE - INFORMATE

The traditional view of information being somewhat a by-product of the transaction application requires clarification of other related concepts. Firstly the word 'automate' is often associated with transaction oriented systems. However, in this thesis, the concepts not inter-changeable. 'Automate' is seen as meaning the application of technology to areas of current human activity.

Contrasting the role of technology as a transaction handling system, or as part of an automating exercise, information technology may also be used as a device to informate. Zuboff (1988, 1994) makes the distinction between 'automate' and 'informate'. The informing role is seen as a by-product of the application of technology to the automation process and/or the transaction based application. However the informing procedure necessitates an additional human activity: that which attributes meaning to data, and that has an intimate relationship with 'knowledge': knowledge can determine that meaning, as well as being the result of the amalgamation of the data plus meaning. However, it is not good enough to assume that an application which is intended to automate, or to hold certain

transactions, will necessarily provide useful data by which the recipient may be better informed. Winter et al, 1995, uses these principles to link information to wider human activities. It is also used by other writers, for example Galliers (1993), to thereby justify the assertion that the study of information technology is both a technical and also a organisational, business and social area of study. If we are to accept that technology has a part to play in information provision (as opposed to only handling transactions), then we must accept that the study of information technology is component of a wide and rather eclectic amalgamation of divergent disciplines (Swanson 1985).

'EVERYDAY' ANALYSIS OF INFORMATION UTILISATION

It seems that information technology is one component of the discipline of information systems. Studies have shown that associated management and organisational issues are considered of primary importance for UK management (Watson & Brancheau, 1991; Clark, 1992; Niederman *et al*, 1991; Galliers 1993, Burn & Szeto 1997). Such studies have been based on survey work and do not try to discuss *why* respondents attach importance to such issues, or indeed why they responded to the survey as they did (meaning). It is generally based on the assumption that information technology has failed in some way to deliver 'business value', and can be seen as part of a 1990's recognition that the technology often does not deliver value, or that it fails to reach its full potential. There has therefore been much interest in concepts such as Strategic Information Systems Planning (SISP) which uses varied frameworks to justify expenditure (or otherwise) on technology investments. Many frameworks are derived from other studies (see Ansoff 1991; Porter 1979, 1980, 1985; Porter & Millar 1985; McFarlan 1984; Nolan 1979) which have themselves been derived from classical notions of corporate strategy and economics rather than on the socially oriented analysis of everyday use of *information*. Whilst the scientific basis of these is not questioned, these accounts lack a certain reflective account of the value laden assumptions made in some of these frameworks: for example, some assume the goal of 'profit maximisation' and that they are dangerously close to assuming that the *process* of strategy is a senior managerial exercise which can be 'imposed' without the complimentary and on-going involvement of other stakeholder groups or individuals. If this is the case then, there is also an additional assumption that management have a great deal of power to enact such visions, and that such models are 'rational', and therefore in some way socially 'justified'. It is no doubt true to assert that such approaches could be in danger of under-estimating the everyday complexity of everyday affairs in organisations, as well as the value laden assumptions that strategy

makes. “*The day-to-day actions of an individual today are globally consequential*” (Giddens 1994, p. 57). Yet it would be naive to suggest that such models were assumed to be used in isolation, and that the practice of strategy implementation was something that did not consider the social dynamics. Thus there have been attempts at developing wider and socially oriented analysis of some of the strategic issues, and a movement towards more ‘interpretive’ approaches (see for example Dhillon 1995).

There are a number of further points to be made here.

- Some of these ‘classical’ assumptions have been challenged in the Management literature but remain somewhat under represented in the Information Systems literature (see for example Minzberg 1978, 1987, 1990, 1994a 1994b; Whittington 1993; Stacey 1993).
- The value laden assumptions of the Information Systems strategy models have not been given as much attention as the models have themselves. Thus for example, within Business Process Re-engineering implicates that the strategic manager (or ‘re-engineer’) can take quasi-objective criteria, apply such principles, and come out with ‘better’ organisation design. There is no concept of power, negotiation or even complexity (Kawalek 1994); there is no analysis of resistance or conflict, and where such analysis does exist, it is often legitimated on the grounds of the management need to suppress such resistance (see Sockalingon & Doswell 1997).
- There is a danger that focusing on the application (or imposition) of certain frameworks (‘strategic’ or otherwise), can result in a lack of focus on the *everyday* usage patterns of technology and of information. This is an epistemological issue which has practical implication. Findings in this thesis suggest a very real difference between what *is* and what *should be*. Thus analyses centred around industry sector analyses, opportunity frameworks, formal data flows across units of work and across value chain activities do not reflect on the intimacy of human - data interaction, the creation of meaning and subsequent action, nor does it reflect on power, organisation (or social) structure into which information is intimately associated. Such ideas can easily be brushed aside whilst tied up in ‘objectifying’ information, technology, and the socially value laden goals of their application.

THE 'END-USER'

There is a need for the clarification and explication of the meaning of the term 'end-user' for the current work. The term itself is sometimes used in a rather demeaning manner and is one shrouded in a multiplicity of meanings. For instance, and as Martin (1990, pp. 266) suggests, the term 'end-user' conjures up a view of end-users as being part of some sort of (sometimes a little unpleasant) 'outside' world. It commonly conjures up connotations associated with some sort of 'inconvenience' to the real work of the Information Systems specialist. It might also be perceived as a rather a trivial or rather unimportant activity. 'End user Computing' is often seen as not 'real computing'.

There are a number of both implicit and explicit definitions, summarised neatly by a number of writers. Sipor & Sanders (1989), for instance:

- an end-user is a non-DP professional;
- an end-user is a PC user;
- an end-user is a non-developer;
- an end-user is an infrequent user of a computer;
- an end-user is an inexperienced user of a computer;
- an end-user works in specific functional areas such as accounting or marketing;
- an end-user is a manager.

Yaverbaum (1988) defines an end user as a user of computer technology who is not a programmer or analyst. Rockart and Flannery (1983) use the term 'end-user computing' to mean applications which are end-user developed and operated. Alavi (1985) uses the term to identify the user of results who also creates the software specifications necessary to effect the computing itself. Codasyl (1979) categorised users into three groups - direct, intermediate and indirect. The direct category was expanded by Martin(1982) to include the following activity:

- non-programming end users, who utilise the software of others to manipulate data;

- programming end users, who write software for their own use;
- programming professionals who write software for others.

Rockart & Flannery (1983) develop these categories, by adding the following:

- command-level end-users who manipulate software (but do not write programs) to control their outputs;
- functional support personnel, non professional programmers who develop their skills to become de facto experts in their own functional area;
- end-user support personnel, whose role it is to apply software with some programming for other end-users.

Probably the most common notion which distinguishes an end-user from others, is the distinction between Information Systems specialists and the non Information Systems specialists, both groups being computer users. The term is often used to refer to those people who sit outside the Information Systems 'department', who are in some way affected by and utilise the information provided (Martin 1990). By using this rather broad definition, it could be said that everybody is an end user of sorts. It might be argued that although everybody does not work from a desk with a computer on it, it is probably true that all of us are users of computer generated information: most have interacted with computerised banking or retail systems. This is seen as a *passive* use. In that way, it might be said that by taking a perspective which views information as the primary output of a computer system, then society in general has an intimate relationship with the technologies that support its information, which (to an extent) is able to influence action or create world views.

The *proximity* dimension is a theme which has been developed to help categorise and clarify the term. See for instance Martin 1990, pp 267, who uses three proximity categories, 'direct', 'indirect' and 'remote'. For the purposes of the current work, a slightly simpler dichotomy between operator of the media and the information consumer is used. The operator of the technology (media) is not necessarily the consumer, though the rapid increase in personal computers and inter networking has brought the two together. *The operator ability to discriminate between the sources, to transform and to disseminate based on personal discretion using information technology directly in its varied forms.*

The trend of 'end user computing' has been recognised as an area key importance (see Greenbaum & Kyng 1991). Benjamin (1982) for instance predicted that by 1990 End User Computing would consume 75% of the corporate computing resource (see also Cheney *et al*, 1994). Whether or not this transpired to be the case would depend on the method of measurement, and on the 'categories' and definitions. Yet more recent studies have confirmed continued growth in this area (Wastell & Swards 1995, p. 186 for example). The information consumer continues to be less willing to be 'chauffeured' (Culnan 1983) by the formal information systems, and the trend still remains towards increasing the 'opportunity' for the information consumers to play a very direct role in applying the information technologies.

By way of avoiding the emotive 'us and them' characterisation of the notion of 'end user' as described by Martin 1990, the terms 'information worker' and 'information consumer' are used and 'end-user consumer' is one who uses information technology *directly* for their role as 'information worker' for their own 'information consumption'.

ASSUMPTIONS ABOUT THE GROWTH OF IMPORTANCE OF THE 'END-USER CONSUMER'

The trend which brings the 'end user' of information technology and information consumption together is seen as one which remains of growing importance. See early work by Briefs *et al* 1983, and more recently Chou, 1996. The trend has been referenced in the stage growth theories (Nolan 1979, Galliers 1991, Galliers & Sutherland 1991). The original model, (Gibson & Nolan 1974) was expanded from four to six stages in Nolan 1979: initiation, contagion, control, integration, data administration and maturity. The model has by no means been accepted without question, despite its general appeal. For instance Benbasat *et al* (1984) argue that there is little empirical evidence for many of assertions implied in the basic model. However despite such criticisms, the model has been used and referenced widely, and has been seen to have some general analytical and heuristic value (Wastell & Swards 1995) and it continues to evoke speculation and academic work (see for example Huff *et al* 1988; Jayasuriya 1993; Friedman 1994; Li & Rogers (1991); Wastell & Swards (1995), Wilson (1997)).

The proximity of the 'end-user, and intricate knowledge of information domains (see the 'tacit' knowledge in Nonaka 1991), the increasing awareness of the potential (and limitations)

of the information-in-context make these an important and powerful band for further study. This is alluded to as far back as Nolan 1979. The final three stages, integration, data administration and maturity particularly require that "... the end user and data processing are jointly accountable for data quality for effective design of value added applications." However, this tends to be couched in old terminology which in themselves make associations with older forms Information Technology. The later 'stages of growth' models (Galliers 1991; Galliers & Sutherland 1991) perhaps reflect better the movement away from the conceptualisation of technology as broadly database technology. Here also is a key role for the information and technology users, primarily in the later three stages of the model. The interaction between the increasingly business oriented Information Systems function and the information skilled end-users becomes critical. Table 1.1 is taken from Galliers 1991, highlighting the direction towards an integrated information approach.

	I	II	III	IV	V	VI
Structure	None	Often subordinate to accounts and finance	Data Processing Department	Information Centres	SBU Coalitions. Many but separate	Centrally co-ordinated SBU coalitions
Systems	Operational	Centralised, many gaps	End-users running free Uncontrolled end-user computing	Information Services De-centralised, with some controls	Decentralised but with central control 'Added-value' systems (market oriented)	Inter-organisation systems
Staff	Programmers/contractors	Systems analysts	IS planners	Business Analysts	Corporate business IS planners	IS director, member of board

TABLE 1.1: TOWARDS INTEGRATION OF RESOURCES (DERIVED AFTER GALLIERS 1991)

This model is certainly seductive in its simplicity, and seems to resonate a sort of historic truth. Moving beyond stage III assumes that technology users are integrating their applications into (rather 'unitarist') organisation objectives with a common understanding of how to achieve such visions. It is this assertion that is being questioned (in part) in the current work. Yet this is not to suggest that this model is accepted without some reservations. But also it is not the intention of this thesis to argue particularly 'for' or 'against' such frameworks. However, the notion that 'end user consumers' share the unitarist vision, and translate it into co-ordinated action to achieve the unitarist vision is to make a significant assertion about the nature of organisation.

The drivers for simple analysis for developing direction and policy with regard to Information Systems are derived from the analysis of wastage and expenditure (Willcox & Margetts 1994, Willcox 1994; Hochstrasser 1994, Hochstrasser & Griffiths 1991). Matching perceived user need, user 'fit' and the role of the user in the development process are quoted as major factors to reducing such risk (Tornatzky & Klein 1982, Earl & Runge 1987, Kwon & Zmud 1987, Cooper & Zmud 1990, Marcus & Robey 1983). Most of such models seek alignment of the consumer of information with application design, and developing this alignment will reduce risk of failure.

The stages of growth model has been used to establish a link between the perspectives of the information consumer 'users' and the Information Systems strategy function and planning process. It is also an issue for the information processing and usability function. The dominant assumption is one where a centralised suite of applications which are integrated, are complimented by a number of distributed smaller (end-user) applications; Sullivan (1985) proposed such a model which included elements of Critical Success Factor (CSF) methodologies (Bullen & Rockart, 1981) for de-centralised systems design and Business Systems Planning (IBM, 1981) approaches for more centralised systems both of which emerge from a stages of growth model. Information Systems practice seek to enhance their information resources from both of these fronts which sometimes results in problems of choice (Gunton, 1988). The assertion is therefore one of balancing these commonly 'opposing' forces and to move to a position of 'maturity' for systems design and management.

Yet all such debates assume a certain 'rationality' in the end user consumer visions of organisation goals and how to get there. The analyses contained in the above cited works are

not based on an analysis of the *everyday* situations, the applications of the technology and the motivations of the individuals concerned.

There are some further points that might be made with regard to the assertions of the growth stage models. Firstly, the model is linear and as such inevitably suggests an certain inevitability of a set of events. Like any such model, it can be used in a variety of ways to justify a particular perspective. It does not reflect on the social values or historical epoch in which it was created. Linear views of events in history providing the basis for predicting the future without being reflection on *social meaning* and the values laden in those events, are dangerous in their simplicity and are often empirical excursions (see Elton 1984, Fogel & Elton 1983, Jenkins 1995). Secondly, that without such *meaning* attachment, they assume a certain 'objectivity' and as such might be used in a functional manner, to justify a particular perspective. The perspective often implicit in the use of such models is to heighten the importance of Information Technology or to justify (further) expenditure for instance. Thirdly, it might be used to be applied in *all* organisations without analysis of other criteria for adding value. It is not derived from a contingent view of organisations. Fourthly the growth stage model is showing its age, and nobody could have predicted the proliferation of technologies which move away the database technology that Nolan envisaged: technologies which are increasingly at the hands of the information user. Many of these technologies are often not 'planned' at an information level, and are usually attributed to 'technology advancement'. Useful reflection on this trend may broaden this assertion, and see it as a result of numerous social forces: the power of the Information Technology industry; the thirst for better information and power implications; the economic need to develop new markets - hence 'globalisation' and post modern theories of information (Webster 1995); the need for innovation on the one hand, control and accountability on the other. In other words, the trend has many facets which can be in danger of over-simplification. Fifthly, it presents a broad analysis of *information*. It does not consider information as a value laden concept which might be used as a political, social or social weapon, for innovation, for control or even its fundamental role in dictating organisation structure. It is not derived from an *everyday analysis of information usage patterns* and the meaning attachments of the key protagonists in the social context in which information is used. Sixthly, it generally assumes 'design' of application or of associated sets of human activities, and thereby enhances the role of the 'designer'. It does not recognise the fact that often information is not formally 'designed' for a specific purpose: it is used in an *ad hoc* manner, serendipitous in many cases and the notion that this can provide certain advantages (Ciborra 1991, 1997).

In all, the scientific grounding of such literature tends to be functional, without being subjected to epistemic assumptions.

INFORMATION, THE END-USER AND ONTOLOGY

A further perspective on the formal in informal component in Information Systems might be taken by reverting to some of the classic information literature. For instance Land (1986), Minzberg (1977), Earl & Hopwood (1987) Liebenau & Backhouse (1990) have articulated the 'social' aspects of information and its utilisation (See also Boland 1987). The relationship between the user, the world and the formal and informal components of the information user's is encapsulated in figure 1.2.

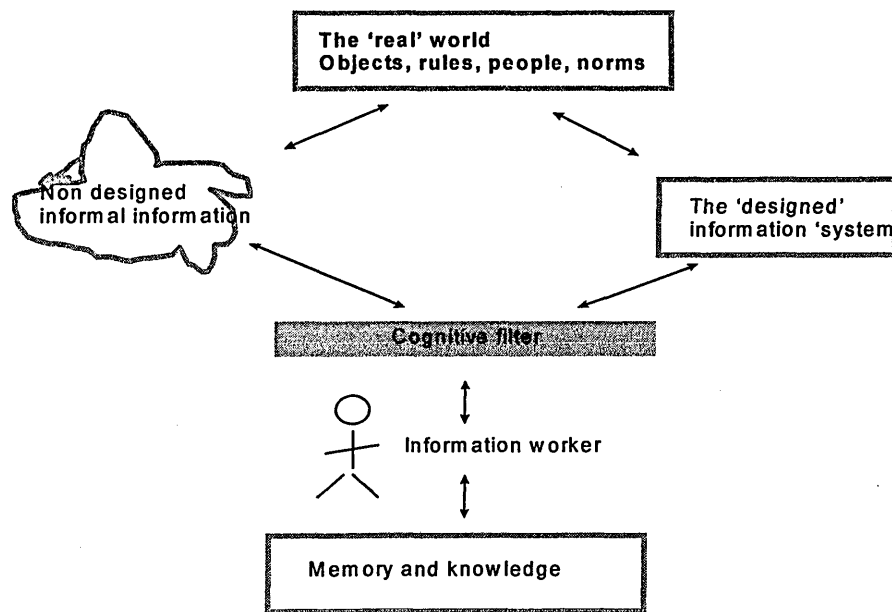


FIGURE 1.2: THE TRADITIONAL DICHOTOMOUS VIEW OF THE FORMAL-INFORMAL INFORMATION DIVIDE, AFTER LAND (1986).

The 'designed' Information Technology applications are often equated with the right hand section of the model, though is not necessarily the implication of Land(1986). To view Information Technology applications in this manner results in a perspective under-estimates the rather fundamental integration of information technology into everyday activity - see also the 'dry' and the 'wet' in Goguen 1992, 1994. Indeed this perception is predicated on a vision of the role of what is now (in the mid to late 1990's) seen as older computer technology. In other words, in 1986 information technology was seen as databases of tabularised data: records of customers, orders, employees and the like. This type of technology remains of importance, but the technology has expanded and developed. For example information services such as the World Wide Web can hardly be seen as a pre-programmed or as a 'formal' information component which determines prescriptive notions of associated managerial decisions, tasks and roles. Technology is *both* formal and informal, and should not necessarily be associated with the formal. Other technologies have emerged: Computer Supported Co-operative Work, process workflow products, internet services and integrated office tools for instance? For a complimentary discussion, see Edwards *et al* 1991, pp. 9. The notion of the growing recognition of the importance of informal information is explored in chapter 3.

Further, and more fundamentally perhaps, is a further implication in the original Land (1986) diagram. The idea that some form of cognitive filter is in operation, which functions much like a tea strainer, on what is seen as a 'real' world set of situations. This assumes a particular ontological view. The model assumes that decision making is based on the quality of both formal and informal data which reflects the 'real' world. This type of does not acknowledge the philosophical notion that it is indeed the individual who creates (in part perhaps) his/her own reality, which interacts with the information environment in a highly dynamic manner. The complexity and chaos of everyday situations often necessitates a rather ad-hoc reality construction by the information user which makes basic assumptions about organisation culture, politics and other key issues. In other words, the original Land(1986) model assumes that the individual has a relatively minor role in reality construction: that the dynamics of human perceptions of 'reality' indicate a highly intricate and dynamic relationship, with information playing a key role. The alternative is a 'subjective' ontological view where there is a far more dynamic relationship with information than depicted in the original diagram: information is gathered and utilised by humans, and it thus contributes to the creation (or justification) of a reality. That constructed reality also determines information. This dynamic *catch 22* can easily be over simplified and can act to under-emphasise the role that the

individual has in creating his/her information world. Figure 1.2 might drawn in all sorts of different ways, which reflect both changing technology and alternative philosophical positions. Figure 1.3 attempts to depict an ontological position, where the perceived real world attaches importance to information components and in some way itself determines perceptions of the real world. It also depicts the informal and formal as potentially being mediated by information technology.

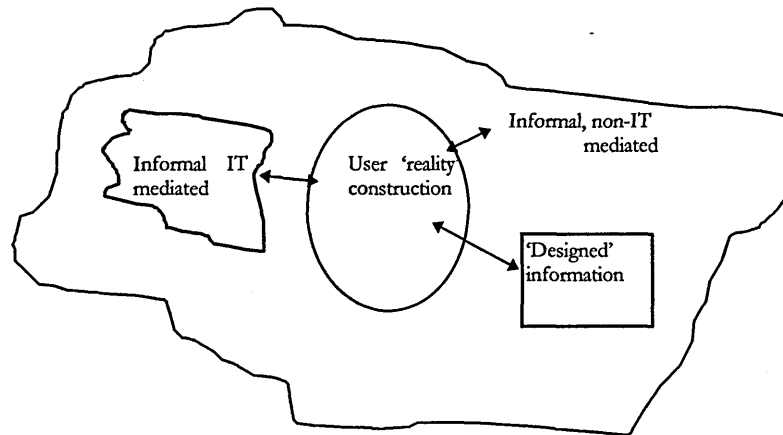


FIGURE 1.3: AN ALTERNATIVE INFORMAL-FORMAL INFORMATION DIVIDE

Taking this alternate 'non-realist' position, there are some other assertions that can be further analysed. It is commonly expressed that data is the raw material for information and that the consumer of the data in some way attaches meaning to the data and knowledge is the result. In this type of analysis, data is separated from information until the meaning of the consumer is applied. Yet this hides a more dynamic relationship, where *knowledge* determines the selection and utilisation of information (and therefore data). See Altheide 1976, Barley 1986, Bjorn-Anderson & Eason 1980, Kent 1978.

For certain newer technologies however (internet, World Wide Web, co-operative products services for instance), the sources of data do not necessarily involve professional Information Systems specialist. The Information Technology specialists provides the

technology but not the data. Other 'users' are more often than not the sources of data. The, the sources do not prescriptively assume who and how the data is to be used - even though certain assumptions might still be made. The user of the data applies and analyses his/her perceptions of need, and knowledge. The role of the Information Systems specialist is often seen as concerned primarily with the technology, rather than with data, and thereby becoming an Information Technology specialist. It follows that the information management is increasingly the domain of the end user consumer, and not of the Information Systems specialist.

EFFICIENCY AND EFFECTIVENESS

Efficiency has traditionally been a key goal behind the implementation of information technology. Techniques have been used to help conceptualise such gains. For instance, can 'redundant activities' be identified and cut out (see the logicalisation activity in SSADM), formalise and co-ordinate human activities (Role Activity Diagrams), specify who has access to what data and when (depicted on data flow diagrams). Useful that these and other application development techniques are, they are often used to depict (often small scale) efficiency gains within current working practice. In other words, they are oriented to 'automation' of *current* working practices with little questioning of other 'effectiveness' criteria or contributions. The following definitions are used in distinguishing efficiency and effectiveness.

*Efficiency = Units of output relative to the units of input within a given
an area of work.*

*Effectiveness = Measures of how well the objectives have been achieved
in the area of work.*

Old bureaucratic organisations that are so often the object of derision, such as local government or the civil service are often seen as 'efficient', but are often seen as lacking in effectiveness (see Ward 1995). The difference between the two is based on systems theory (see Otley & Berry 1980). Ratio analyses such as rates of return on an investment, labour utilisation ratios and the like focus on the need to control efficiencies in the 'system', and are measured in terms of the ratio of inputs over outputs.

The significance of this differentiation can be quite important as it seems that traditionally the automation of different areas of work, can produce efficiency but impacts poorly on effectiveness, and that it is possible that the investment in technology for automating, reduces our ability (or desire) to re-question our original efficiency-dominated assumptions, in effect strengthening efficient, but ineffective sub-units of work. In order that systems can be enable efficiency *and* effectiveness, it follows that any intervention must 'add value' to a set of objectives. This is seen as a challenging and yet rather key area. How, for instance, can we assess the added value that an R&D section contributes to an organisation? Most would agree that R&D is necessary for many organisations, but if we were to measure units of output relative to the units of input, we would immediately see inefficiencies. Indeed the efficiency of the organisation as a whole could be improved by cutting the R&D section! This move however would not be seen as 'adding value' or one which (in the long term) adds to effectiveness. Yet it remains key to the organisations' long term success, and thus arguably adding values and effective. Further, that even given clear objectives, how those objectives are achieved is open to differing interpretations. Simplistic 'benchmarks' will not work because of such differing interpretations. Therefore, evaluation of the level of 'effectiveness' requires critical thinking and reflection within context.

The common assertion is that efficiencies are simple measures of 'ratio's' of inputs over outputs in a given area of work, and can (relatively) easily be measured and therefore impose control. However, where 'measures' cannot be so easily applied, control must be exercised in alternate ways. This has been developed by Ouchi(1979) who describes 'clan' or behavioural controls. End-user technology application may be measured in terms of 'efficiencies' in some circumstances. However, it is not always the case, because of the fundamental contribution that information plays in directing action. It is thus not possible to apply simple benchmarks at a general level. This requires critical evaluation within the context, but given the distinction between 'efficiency' and 'effectiveness', simplistic benchmarks cannot easily be applied.

'STRATEGIC' INFORMATION SYSTEMS

The notion of 'strategic' information systems present notions about how value-added is gained through the use of information systems. A common model used in the literature is that of competitive advantage theory (Porter & Millar 1985, Porter 1980, 1985). Gaining competitive advantage is seen as a 'holy grail' (Galliers 1993) and is based on a number of important case studies such as American Airlines, Otis Elevators, Mrs Fields Cookies (see

Cash *et al* 1994). However it generally recognised that such examples are much more difficult to replicate than originally thought, and such advantages are in fact only temporary and not sustainable. This is a point developed by Ciborra 1991 who argued that on-going adaptation or 'tinkering' via 'oxymoron' is a practical to enable sustainability of competitive advantages gained from Information Technology. The cases where information technology has developed significant competitive advantage were not the result of gained by conscious planned action, and as such cannot be easily emulated. Further, the notion of 'competitive advantage' is based on the 'advantage' over sector rivals or potential rivals. Yet of course, many organisations work outside traditional competitive environments. Therefore, such notions fail to appeal as a generic set of 'benchmarks'.

Thus it seems that gaining 'added-value' will be dependent on particular circumstances at any one point in time, and it may come from planned - or rather ad hoc, unplanned action. Recognising opportunities requires a certain innovative thinking, and the ability (in terms of time, space and support) to opportunise that innovation.

As the accessibility of technology to information workers increases, it stands to reason that an 'evolutionary' and developmental approach is taken. The on-going recognition of added value, opportunity as well as the ability to reflect on the socially laden values and assumptions is rather different from the traditional 'planned' notions of Information Systems implementations (Grant 1991). It is perhaps a complimentary view of the strategic processes. The model developed by Whittington(1993) categorises corporate strategy into four different approaches.

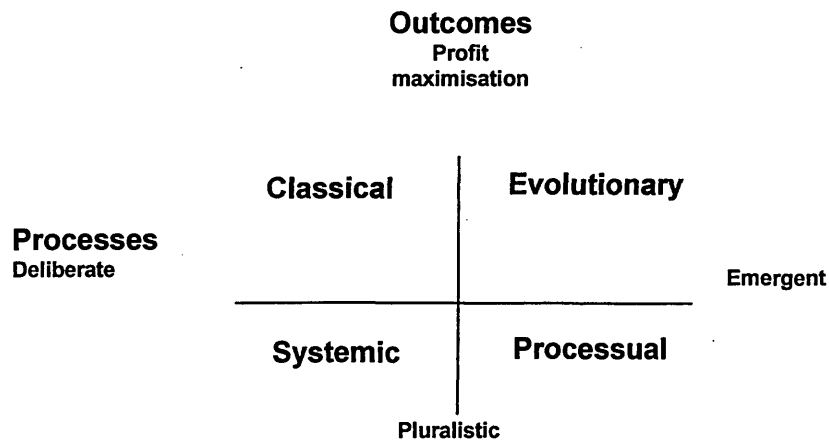


FIGURE 1.4: THE MODEL OF STRATEGY (AFTER WHITTINGTON 1993)

The *classical* approach is seen as the oldest and still most influential. It assumes a rational planning approach which is dominant in the text books; typical of this category are authors such as Porter (1980, 1985), Porter and Millar (1985), Ansoff (1965, 1991). It is argued that simplistic notions or depictions of Business Process Re-engineering would also fit into this category.

The *evolutionary* approach is characterised by a sort of 'fatalistic' characterisation of the market place: a dominant metaphor in this category is that of the Darwinian evolutionary paradigm; Hannan & Freeman (1988), Williamson (1991).

The *processual* approach emphasises the 'sticky' and rather 'imperfect' nature of all human life, and pragmatically accommodating the strategy to the imperfections of the market; Cyert & March (1963), Minzberg (1978, 1987), Pettigrew (1973, 1985).

The *systemic* approach is relativist, regarding the ends and means of strategy lined strongly to the culture and powers of the local social systems in which it is placed.

Strategy in the discipline of Information Systems is not only to support the planning of large computer investments; conceptually it is also about the ability innovate with the new technology, and therefore with information, which is a 'pluralistic' and 'emergent' exercise, a theme already articulated in the discipline of Information Systems (Peppard *et al* 1996). Indeed strategy in Information Systems may be also seen as a social process (Eden 1992, Kawalek & Hackney 1998d). If the practice of Information Systems is seen as involving groups other than the Information Systems specialist, then it must be subjected to analysis of the social processes involved (see Kling 1980, 1987). Whilst this thesis concentrates on the social constraints on innovation and learning at the end user level, there is the obvious linkage to the 'emergent' characteristic of information systems: it sees such strategy as not entirely planned and implemented by rational action. This is explored in chapter 6 where the use of Structuration Theory is applied, and compliments other literature (see Poole & Desanctis 1989).

INFORMATION AND APPLICATION DEVELOPMENT

Recent discussion on information technology application and design and associated planning of change and strategy, has remained to be directed towards the achievement of over simplistic notions of desired information end-states. These end-states assume a certain information and associated technological application prior to application design. The dominance of hard analysis and design techniques (with a history of being applied to transaction based systems developments) remains a key 'paradigm' for information based systems application development. Thus investigative techniques for the establishment of user-information need at a single moment in time, are oriented towards the deployment of technology to service those needs. These are oriented towards 'control' of some aspect of organisation activity, integrating disparate information sources. The traditional approach in application development has been oriented towards the employment of technology to meet those needs and as such are regarded as an 'end-state'. Adaptive procedures are generally undertaken when it is felt that these end-states have not achieved according to pre- or newly specified conceptualisations of need, and/or when intervention is necessary. This thesis argues that in the domain of information provision in organisations, this type of end-state oriented approach has in part created a paradigm of thinking in the practice of Information Systems which often fails to acknowledge the diversity and complexity of the information and the patterns of information usage of *everyday* work situations. This has direct implications for the discipline of Information Systems. Over-simplistic notions of information end-states will only be effective in all but the simplest of application contexts for information technology. Integration of simplistic notions of efficiency within equally simplistic frameworks of information need derived from current working practice, can lead to the deployment of technology which has at best, limited *information* value for the changing information worker perceived needs.

Thus it is asserted that the goal oriented approach for seeking efficiency gain has been a 'dominant paradigm' governing much of the thinking the methodological debate underpinning the application development process within the discipline of Information Systems. As such, notions arising out of traditional development methods, may still be appropriate for 'control' in core operations which have discrete application and associated information utilisation, but are increasingly questionable when applied to often complex information intensive activities of many other areas of organisation. The dual focus on information provision end states, along with the notion that deployment of technology primarily aims for short term efficiency gain in current working practice, results in

technology which fails to account for user-led *innovation*, information utilisation, enhancement and the informal information activities which are key drivers for change over time. A number of points might be made on this type of analysis. Firstly, the diversity might be seen as the *generator* of change rather than some kind of inconvenience for managers and implementers of technology. Secondly, the diversity of the process in many areas of organisation activity follows a highly complex multi-dimensional path which do not conform to linear or technical assumptions which are based in traditional approaches in management science, as well as the deployment of technology. Thirdly that simplistic notions of change hinder the ability of supporting technology systems to adapt to environmental uncertainty, often reflected both in technical designs and in associated procedures. Fourthly, that the 'paradigm' has resulted in poor information support for end-users, applying their own technologies for perceived information needs. Fifthly, end-users themselves have a 'constrained' view on their own information need, which is fused into their own personal goals and ambitions.

Tacit use of such terms as 'end user computing' and 'end user development' has been used widely, but one which has had little attention in terms of key definitions and theoretical underpinning, grounded in the experiences of such a group in organisations. Seeking generalisable thinking around such a 'grouping' is in many cases used in an over simplistic manner, and sometimes makes wild assumptions about 'productivity' benefits or lack of them. Tacit use of such terms also brings with it over simplistic assertions of the limitations and technical credibility of applications that are 'developed' or are 'enhanced' by the 'end user'. Criteria for evaluating such applications tend to be based on the technical 'sleakness' or on how they 'contribute' to 'unitarist' views of organisational objectives or how to achieve them, often assuming the fundamental goal of profit maximisation. For example, the integration into wider business data/information flows or some other 'rational' efficiency/effectiveness criteria. Accounts of the trend towards end user computing fail to focus on such factors such as the need for learning and innovation, the failure of Information Systems to implement effective information technologies to support the variety of personal or function specific goals, and/or within areas of work which are changeable.

Whilst appreciating the need for information which displays regularity and order, which is often seen as the 'heritage' of the organisation, there are obviously information contexts which are highly ephemeral and *ad-hoc* in nature: this represents an opportunity to explore the idea of a sociology of innovation (Jones 1997) with information and technology *both* seen as

key enablers. Information Systems research has been dominated by the 'design' school (Lyytinen 1992) which has subverted some of the wider debates as part of the mainstream study of Information Systems. The thesis advocates a that there are contexts where there is a need for deviation away from traditional application development and the 'models of strategic alignment'. These have subverted some of the more fundamental questions around everyday information utilisation: about the 'emergent' and innovative characteristics in information provision. This is no doubt an argument which is a product of its time: technology remains increasingly available to non Information Specialists in a variety of forms, and there is current emphasis on decentralisation and flexible working. The perspective presented results in an agenda and proposal for an information management strategy which informs the technology strategy, within which is aligned an *on-going* needs - strategy approach. In this way it moves away from the 'end-state' notion which is apparent in the information systems development literature. Technology is seen as a key enabler for the effective use of information, rather than primarily a tool for efficiency determined by simplistic application to transaction handling, with information seen as some sort of by-product.

An information system *often* needs to be highly dynamic. However, it is not to say all computer applications are seen as needing to share such dynamics. It is suggested in this thesis that the dynamics of a particular application is directly affected by the dynamics of the wider environment and the envisionment of how it is to be used. Traditional roles of computer application developers in the past have perhaps reflected the lack of dynamism in the environment and/or the perceived lack of dynamism of the application: as already discussed a simple transaction processing system which consists of a relatively static algorithm to produce (for example) payslips, with little conceptualisation of the informing potential of groupings of such transactions, might be considered an unchanging, undynamic application or perhaps a relatively undynamic information system. More accurately, these types of applications might be best seen as undynamic data handling applications. The method used to develop such a system will reflect the simplicity: one of the key findings in this work is the need for an evaluation and definition of this notion, and what its effect is on method, application design, as well as issues such as human roles and activities within the on going information (and thus application) enhancement. The thesis also argues that method and techniques are bound to be affected by the dynamism of the information environment. It is proposed that this is an important area that the traditional emphasis in the discipline of Information Systems tends to lack in emphasis and focus.

The thesis thus draws upon the complexity of the social process and environment to suggest that pre-programming the information requirements of 'end-users' or 'information workers' might be seen as a traditional and (in some circumstances) old fashioned idea commensurate with the simple transaction systems development of the 1970's and 1980's. In practical terms, it is of course still needed but research should be moving beyond this. Recognising the changing environments characterising the organisation of the 1990's and beyond, requires some sort of alignment between organisation theory and the technological designs and implementations which is supposed to support that environment (see Lambert & Peppard 1993). The thesis puts a perspective upon which further work might draw: the user as protagonist; the technology specialist as facilitator; Information Management as driver of technological application and evaluation; the central role of flexibility and enhanceability in technology applications and designs; the rapid application development and prototypes managed, driven by effectively trained information workers; information integration and enhanceability across inter and intra organisation work units. These are presented as ideals rather than as a reality as shown in some of the empirical work undertaken. Users cannot in themselves take such responsibility without the development of critical questioning, but this is not aided by supporting Information Systems specialists who are themselves rather uncritical. Even though not applied formally in many instances, application development work has been dominated by broadly a 'waterfall' type approach, and it is argued that this is a limiting notion for better *everyday* analysis of information utilisation in organisations.

THE INFORMATION WORKER AND HIS/HER INFORMATION WORLD

It is thus argued that issues around 'end user' computing (EUC) should be considered of mainstream IS concern, rather than an inconvenience to traditional computing sciences. However, contrary to mainstream thinking perhaps, it is a perspective which puts the information worker at the sharp end of the complexity within organisations; it is he or she who represents the power, culture and politics; it is he or she who is embroiled and seduced into the organisation, both simultaneously playing a role in determining action and decision making which, at the same time, might be seen as determined itself by the organisation politics, culture and power. The role of information in this complexity is easily simplified not least by those who claim to be specialists in the field. The argument in this thesis is that it is

the users of information who are the real protagonists or information specialists, and this has implications for the discipline of Information Systems.

However to use the term 'end-user computing' is seen as doing the focus of the thesis potentially a slight disservice. The term is used with an ambivalent sentence. It is a term which is seen as having a sort of 1980's and early 1990's connotation associated with some sort of 'inconvenience' to the *real* work of the IS/IT specialist in practice, or the 'grander' objectives of the discipline. It might also be perceived as a rather a trivial or rather unimportant activity. Its meaning in this work attempts to encapsulate the sharp end of information systems - the customers perhaps, who shape, mould and ultimately evaluate the product (the information delivered by technology). The system that supports the information provision is not seen as some sort of *fait accompli* signed off and paid for. Rather, it is argued, it should be considered dynamic, accountable and enhanceable to and (in many iterations) by the user, reflecting the organisation change, culture and power rather than attempting to purposefully shape such key characteristics based on over simple sets of criteria which are justified by appealing to and justified by 'scientific' prescriptions.

The focus of study thus has been on middle managers in a number of organisations; these are key information workers and are also users of computerised information technology. Their traditional role has been as consumers of information and, until recently, had little direct involvement with computer technology. Yet increasingly their role has been increasingly adapting technology to enhance information provision.

PERSPECTIVES ON LEARNING

The implications of the above results in a key learning agenda. The agenda presented is certainly not seen as some sort of end-user 'free-for-all', which is often the 1980's image presented by other IS studies on 'end-users'. Rather, the current work presents an argument for taking individual responsibility for information and the recognition of the motivations and sectional self interests that influence those motivations. This theme is developed in the thesis whilst, at the same time, recognising some significant practicable constraints. Often these are technological, power based, cultural; the central notion of Agency derived from Structuration Theory is proposed as a way of identifying discursively such everyday constraints. By the application of the concept of Agency the discursive and reflective learning is developed: the learning agenda for 'end-users' has been focused on skills in handling

packages. Rather, this thesis advocates a conceptualisation and evaluation of opportunity, as well as techniques for information transformation and enhancement; for users to be enabled to evaluate their own *information* work, within the contexts of structural influences or 'constraints'; to be the skills of identification and evaluation of need and value-in-context which requires reflective analysis. Information is not seen as a bureaucratic set of procedures. Users need to be better equipped to evaluate the *raison d'être* of the 'constraints', on associated procedures and motivations, and be questioning of the information that they assume to be required. The premise is based on the (perhaps naive) assertion that if in general, individuals can see new opportunity/advantage, then the barriers will break up or at least erode.

Evidence presented in this thesis shows the term 'end user development' is often a highly emotive one, which often depicts a situation of power and conflict between the specialist developers and user communities. Further, that where end-users are 'developing' information technology based applications, it is done in reaction to different types of frustrations and/or contextual social pressures: for instance the perceived incompetence or even non-existence or non-availability of suitable information and technology; utilisation of technology as social defence by developing 'ownership' of a particular function and enhancement of skills. The thirst to develop competence (consciously and/or subconsciously) in the IT area has also been a driving force for 'end users' developing their own applications. Of course, IT is seen as a highly marketable skill in an insecure employment market. Again, the empirical evidence seems to suggest that these are substantive factors, and yet it remains a less than convincing argument that there are *substantial* benefits in information utilisation, even though the promises are high. The promises are high because of the subjective and ephemeral nature of information itself - which cannot be 'in-built' into an MIS in any other than the most predictable and routine areas of work. For middle management 'users' (information consumers) this is often seen as inappropriate, and thus it makes initial sense to increase their own control (personal or sectional) in a particular information environment by applying the technology in creative and new ways, often legitimised around notions of 'expertise' in particular areas of work. Yet in general it is done with little planning, being based around rather fleeting whims. This might be seen as simultaneously both strength and weakness depending on the assumptions inherent in any one evaluation approach: on the one hand might be seen to enhance flexibility and control around skill and expertise; on the other, is an agenda for poor integrity, duplication and non integration of information across functional areas of work. Without such analyses of these two strands, there is inherent conflict between them. On the one

hand, for standardisation, over-simplification of the uses of information, poor information innovation and ultimately with information poor technology application; on the other hand, there is the contrary view which sees the dangers of applications which are highly uncoordinated and poorly managed which may cause greater information difficulties than they solve. Whilst recognising the relative merits of investigating the technology possibilities, there remains a need to recognise a reflective information management learning agenda on two broad levels. Firstly, on the level of the pragmatics in the everyday practice of Information Systems: it seems both Information Systems specialists and technology 'users' have few simple heuristics to conceptualise such problems. Secondly, more fundamentally and at a broader theoretical level, the discipline of Information Systems needs to embrace a critical evaluation of its own assumptions between tasks and structures, that of information and human cognitions of its value in context.

The role therefore of Information Systems staff (Information Centre) becomes one of facilitator - not only focused on software and hardware support, but on *Information Management*, and facilitator of reflective learning and development. The 'why' is as important a question as the 'how'. It advocates therefore an 'empathetic' and reflective approach at in the practice of supporting and assisting the development user perceptions of information need. At a theoretical level, this is seen as subjective in both epistemology and ontology: an issue which is not entirely clear in the Information Systems literature. In this way it represents a justification for better reflective learning, but does not detail issues, for example, such as learning style, which is dealt with elsewhere (see Kolb & Fry 1975, Mumford, 1982, 1987). Rather, the need for learning at an end-user level, towards Information Management, is a conclusion, and opens up possibilities for future research into operationalising and evaluating the impact of learning issues and approaches for the technology user.

CHAPTER 2

CONSIDERING RESEARCH STRATEGIES

The safeguarding of the subjective point of view is the only but sufficient guarantee that the world of social reality will not be replaced by a fictional non-existing world constructed by the scientific observer

Alfred Schutz 1964, pp. 8

INTRODUCTION

Analysing the history of scientific method it seems that defining what makes up a valid 'scientific approach' is bound by its history and current development (Butterfield 1949; Kuhn 1970; Hesse 1980). At times the study of scientific method appears an arduously complex and highly ephemeral activity. This is the case because the world views, perspectives and contexts of principal proponents associated with key scientific developments need necessarily to be investigated, in order to establish insight into their reasoned conclusions. Their conclusions are constructions which are derived from the historical milieu from which they were created. The 'natural sciences' have dominated scientific discovery, and there are some well known principles that govern this scientific thinking: the reductionism to define and redefine the complex into simpler parts; the repeatability of experimentation (or purposeful observation) and thus the generalisability of theory to differing circumstance; the refutation of hypotheses which causes changes and enables development of understanding. The equation $E = MC^2$ repeatable. It can be tested in England, US and then Australia. The results will be the same, given the same conditions. Changing quantities can change the result. This implies of course that all variables can be accounted for and that they can be accurately be measured. It might be argued that the most powerful scientific facts are those which can be expressed in some form of quantitative experiment, with the logical consequences of the information embodied in the experiment results (Richie, 1945). Such credence is embedded in traditional western philosophy, and scientific 'fact' can indeed be a powerful *social* force (Livingstone 1986). The credence is itself a value judgement which can be a source of power in its specific utilisation (Darwins theory of evolution to justify racism for example). The traditional significance attached to

experiment and testing suggest that there is a value attachment to the scientific experiment. It seems that the value of scientific experiment is measured not just in terms of how repeatable the experiment actually is, but how valuable it is in terms of perceived knowledge development (Reason & Rowan 1981). The value is also expressed in terms of how such approaches are used to justify a perspective and, sometimes, wider social ambition.

In parallel with notions of experimental science, awareness of the logic being used has also developed. This is normally categorised into either inductive or deductive logic. Inductive methods, it is sometimes suggested, cannot prove anything. It enables a theoretical construct to be built from observation or 'fact' whereas the deductive method provides an effective reasoning pattern or syllogism, in order that proof according to current scientific consensus can be provided. Induction provides a theoretical basis by which an observer can construct a reality. Deduction is the attempt to prove it, and much of scientific history is made up of iterative inductive/deductive modes of inquiry.

PROBLEMS WITH 'NATURAL' SCIENCE APPROACHES

Yet the variables are not always testable, repeatable or even easily definable (Lincoln and Guba 1985). In assessing the 'contribution' and behavioural traits of technology users, the key variables are difficult to define, and impossible to 'measure' (Cirourel 1964, Nagel 1961, Pantin 1968). Thus certain 'qualitative' areas of study must have alternative scientific approach which is (ideally) no less rigorous in order that sense can be made from them Schutz 1962. The hierarchy of the sciences as described by Boulding (1956) suggest a natural development of science towards that of the human being him/herself. This heuristic is interesting and useful. However it would not be correct to argue that the higher levels of 'scientism' (away from the human) is necessarily *better* science. Perhaps the variables are more measurable, but it does not mean that it is not a fallible human construction. There is some similarity in the various attempts the categorisation of research approach according to a set of basic beliefs regarding the definability and measurability of key variables. Figure 2.1 is taken as an example from Guba and Lincoln (1994).

Paradigm	Positivism	Post-positivism	Critical theory	Construct-ivism
Item				
Ontology	Naive realism - 'real' reality but apprehendable reductionist and deterministic (Hesse 1980)	Critical realism - 'real' reality but only imperfectly and probabilistically apprehendable	Historical realism - virtual reality shaped by social, political, cultural, economic, ethnic, and gender values, crystallised over time	Relativism - local and specific constructed realities
Epistemology	Dualist/ objectivist in that the investigator and investigated are independent; replicable findings are true	Dualism is abandoned or modified. Remains an objectivist stance; critical tradition/ community (do findings fit with the tradn); findings probably true	Transactional/ subjective; value-mediated findings	Transactional/ subjectivist; created findings
Methodology	Experimental/ manipulative; Verification of hypotheses stated in proportionalistic forms and thus chiefly quantitative methods	Modified experimental/manipulative; critical multiplism(or modified triangulation).	Dialogic/ dialectical	Hermeneutic/ dialectical

FIGURE 2.1 : BASIC BELIEFS (METAPHYSICS) OF ALTERNATIVE PARADIGMS, AFTER GUBA & LINCOLN, 1994, P. 109

Like the Boulding (1956) model, this can be to justify a particular approach in scientism. Whilst each remain interesting and are, of course useful heuristic models, each piece of research must justify its 'basic beliefs' and approaches to research. The above is derived

from the well known Burrell & Morgan (1979) paradigm model which attempts at categorising into 'paradigms' certain key philosophical assumptions: this is applied to the nature of phenomena and basic beliefs of the researcher (ontological position), the nature of knowledge of those phenomena (epistemology), and the nature of ways of studying those phenomena (methodology) and has been used in a wide variety of disciplines (see Gower & Legge 1988). These three dictate the approaches taken by the scientific researcher. Most research methodology texts will include a similar form of taxonomy (see the positivism-phenomenology dichotomy developed in Easterby-Smith *et al* 1991, or the six classical philosophical positions and four reasoning strategies of Blaikie 1993 for instance). There are obviously 'rationalisable' reasons for these, and there are major problems in assuming that, because traditional science is dominated by quantitative data, it is valid to apply it to less than quantifiable areas of research (see Sechrest 1992). Given that much of human activity in organisational contexts are in fact rather difficult to define, measure and evaluate, then these alternative scientific positions have emerged. Each such construction can guide the philosopher and researcher but, being a human construction, cannot be seen as 'objective' or 'right'. They themselves are a product of their day and subject to the fallibility of human construction. It is not the intention here to recount (as is often the case) the varied approaches encapsulated in the Burrell & Morgan (1979) paradigm model. However, it is important to critique the paradigm model, as this enables the development of subsequent debate; it also enables the critique of certain studies and approaches which base themselves in a single 'paradigm'. Thus the current chapter will debate the applicability of various strategies of inquiry, as well as questioning the applicability of the Burrell & Morgan (1979) model, which groups together ontological, epistemological and methods as depicted in figure 2.1.

ONTOLOGICAL AND EPISTEMOLOGICAL 'POSITIONS'

Thus it is of some philosophical interest to scientific research whether or not such paradigm models remain appropriate theoretical constructions which underpin the study of organisations. Indeed there has already been substantive philosophical debates regarding the 'incommensurability' of the Burrell & Morgan 1979 model (see Reed 1985, Jackson & Carter 1991, 1993, Willmott 1990, 1993a, 1993b). This question has been raised in the discipline of Systems (see for example Burrell 1983, Mingers & Brocklesby 1996, Bernstein 1983, 1988), and this may have importance for the discipline of Information Systems, assuming there is a linkage.

The perspective presented in this thesis is one that generally rejects the notion of ‘exclusivity’ of the paradigms, though would argue that they, at the present time, remain crucial heuristic devices, and thus theoretical work in the organisational sciences depend on their application. Thus, it is important to accept the historical constraints in which this work is written: organisational sciences are only at the beginning of such an excursion away from the relative securities of analysing organisations in terms of the *subjective-objective* and the *order-conflict* divide as depicted in the Burrell & Morgan (1979) model. Though there are some observations derived from this type of analysis which should be included and are developed and explained in the following sections, which deal with the epistemological and ontological assumptions of differing approaches to research, starting with an analysis of the basic assumptions of the paradigm model itself. This debate is seen as crucial, in order to secure the epistemological foundations for the current work.

PROBLEMS WITH THE BURRELL & MORGAN (1979) MODEL

The Burrell & Morgan (1979) paradigm model, being a product of its time, and has been used to help justify alternate perspectives in scientific thinking, other than the dominant form which was based on experiment. The 1990's debate in information systems (see Allen and Ellis 1997, Kawalek & Johnson 1998) is seen as an increasing awareness in some of the basic constraining assumptions inherent in it, reflected also in other disciplines (see Arndt 1985). Indeed this thesis argues that substantive theoretical constructions should guide data collection, yet these do not always sit comfortably in any *one* segment of the paradigm model. However it is precisely the assumption that one ontological 'basic belief' approach dictates epistemology or vice versa. The two are not the same thing and are not necessarily best grouped together as assumed in the Burrell & Morgan model. Separating them can provide a useful debate on the relative positions of differing philosophical accounts. Figure 2.2 provides a way of conceptualising this difference with a suggestion of where differing philosophical accounts might be located. Each position has differing strengths and weaknesses, and it is the objective of the current chapter to lay the foundation for consideration of the most appropriate approach for the current research, and this, as will be seen in the concluding chapter, has implications for the practice of learning and education within the discipline of Information Systems.

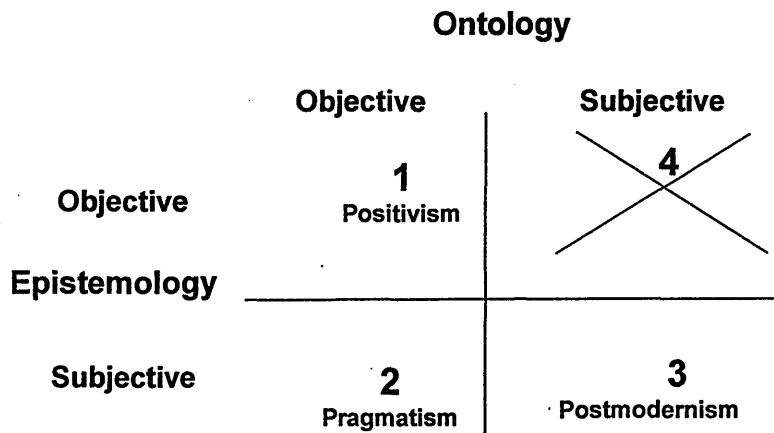


FIGURE 2.2: SEPARATING EPISTEMOLOGY FROM ONTOLOGY.

Because certain questions in science require the investigation of subjective constructions, in terms of basic beliefs about the 'knowability' of the world (ontology), and the approaches/assumptions taken in constructing knowledge about that world (epistemology), then it seems appropriate to separate these two dimensions. The separation is in terms of the construction of the world as dependent on the subjects of study, or on the observers construction, justified with 'objective' scientism such as experimentation and mathematical justification. Indeed this has been a dominant theme, and Burrell and Morgan (1979) reflect Windelband's (1901) separation of the natural (dominated by nomothetic methodology), and cultural sciences (dominated by ideographic methodology).

Nomothetic		Ideographic	
Laboratory	experiment	Survey	
Analytic		Ethnography	
Deduction		Induction	
Discovery of causal relationships and determining 'laws' (etic)		Exploration of subjective meaning, and explanation by understanding (emic)	
Quantitative data		Qualitative data	
Uses control groups and 'testing'		Focuses on analysis in a 'natural' state to rule out researcher influence on the subject	
Structured research methodology		Minimum structure in approach	

FIGURE 2.3: NATURAL VS CULTURAL APPROACHES IN SCIENTIFIC METHOD

Moving around the diagram in figure 2.2 in an anti-clockwise direction, the differing segments are numbered and are briefly described as follows. The fourth quadrant is seen as theoretically possible, but one which is not explored in this work.

1. OBJECTIVE ONTOLOGY AND OBJECTIVE EPISTEMOLOGY

This is perhaps the dominant western that dominates its culture and its scientism. It assumes that constructs are separate from the human scientific observer; the variables are 'discovered' and relationships between variables can be 'tested' using a variety of means including experimentation. It is commonly argued that the dominant scientism is derived from the

works of Comte. In *System of Positive Polity* published as four separate volumes (Comte 1851, 1852, 1853, 1854) Comte formulated a concept called *religion of humanity* and *law of the three stages*. According to this latter 'law', human explanations of natural and social processes pass through three stages: the theological, the metaphysical, and the positive. In the first stage explanation is sought as the work of supernatural powers. In the second, explanation is sought by means of such abstract ideas as 'causes' and 'forces'. In the third stage, explanation is sought by the accumulation of factual data and relationships among the observed facts. Comte believed that astronomy, physics, chemistry, and biology had evolved through these stages. He sought to organise the social sciences along such 'positive' lines. This 'stage' structure has been the subject of much debate (see Boulding 1956), and the application of the 'positive' has also been highly influential in the development of modern science, and the subject of debate on its applicability in differing areas of scientific thought. This 'positive' approach makes a basic assumption of the subject being studied is in fact 'knowable', independent of researcher or subject constructions. It is in that sense, 'objective' in ontology, and this influences the epistemological assumptions on construction of knowledge.

2. OBJECTIVE ONTOLOGY, SUBJECTIVE EPISTEMOLOGY

Yet the general applicability of the above to areas of social science is seen as problematic. This is well documented in the literature, and a 'list' of such objections is not going to be recounted here (see Guba & Lincoln 1994). Yet it does not necessarily follow that an 'objective' basic belief in ontological terms necessitates an epistemological approach which is also 'objective'. This is one of the criticisms of writers which advocate 'incommensurability' of the Burrell & Morgan (1979) paradigm model. Thus an essentially subjective approach in epistemology to enable an essentially 'knowable' aspect of the world (ontology) is appropriate. This is an objection raised with regard to Soft Systems Methodology by Burrell 1983. This position involves a construction of a 'reality' from the study of the subjective constructions of subjects - a process of 'objectifying' in construction, (see also the debates by Bateman 1971, Bannister & Francella 1971). This position involves a 'construction' of a reality. The Pragmatism of Rorty (1979) for instance argues knowledge about the world or some element of it is justified (and thus 'objectified') if it is supported by the consensus of people in a specific community (Rorty 1979, p. 173). 'Pragmatism', is a relativist position where knowledge is justified because of the consensus that a community attaches to it in any

one context: it is a position which other communities cannot judge because invariably they judge it by separate standards. This position assumes a subjective method in research approach and knowledge construction (subjective), and is 'knowable' in an ontological sense because of the consensus of those involved (objective). The problem with this position is that it tends to make impossible criticism of established traditions, understandings and practices; it could be criticised that it tends to encourage the acceptance of the power and authority status quo. This is a criticism also levelled at Soft Systems Methodology (see Jackson 1982).

3. SUBJECTIVITY IN BOTH ONTOLOGICAL AND EPISTEMOLOGY

This quadrant assumes that aspects of the world being studied are not 'knowable' (ontology) in an absolute sense, and the guiding approaches to knowledge construction (epistemology) is also subject to interpretation; meaning construction and critical reasoning processes make valid the science - not verifiable experimentation. This position is increasingly common in Management theory, as it questions the basic assumptions of 'rationality' in its own methods. This is reflected in postmodernism, where issues and approaches of dealing with complexity are only expressions of the historical epoch in which they are created or applied. Thus 'rationality' is seen as a social construction in order to 'justify' particular social stances or goals. This is seen as a highly reflective philosophical position applied in a variety of research areas (Clegg 1990), which relates the construction of scientific knowledge to the epoch of post-modernity in which those constructions of reality were placed. By this reflective approach, the link between social power, and the 'legitimate' constructions of knowledge are explored, with a view to gaining further insights. One influential writer which has influenced the development of much of postmodern thought is that of Habermas (1972, 1974), who argues that *knowledge itself* is a product of the everyday imperatives of human life, and cannot be seen in any way as 'objective'. Even with a critical eye, the 'solutions' are socially laden, and can be accused of a sort of 'imperialism' via critical reasoning. "... by making a dogma of the sciences' belief in themselves, positivism assures the prohibitive function of protecting scientific inquiry from epistemological self-reflection. Positivism is only philosophical in so far as it is necessary for the immunisation of the sciences against philosophy." (Habermas 1972, pp 67)

In this way the epistemological position Habermas's Critical Theory recognises that its account is bound to be subjective. Yet this position has its own problems as described below.

THE SUBJECTIVE PROBLEM

If it is accepted that all knowledge is socially constructed, then it seems difficult to heighten one perspective over another. Thus a single perspective cannot justify itself. This makes picking through a key issue lapse into incoherence as it is bound by its socio-historic construction and remains a purely subjective and relativist perspective, which is in a sense destructive of its own perspective. Furthermore, if such a position was considered the 'correct' epistemological position, then it tends ironically perhaps, to deny the basis for disagreement.

Burrell & Morgan's (1979) paradigm model assumes in one quadrant both 'realist' ontological position associated with a 'positivist' epistemology. This quadrant relies on certain a 'theory neutral' observational language. In other words, the subject and observer is seen as being able to describe phenomena which is in some way independent of the contextual constraints of the construction, or of the theories, frameworks and language of the construction. The incommensurable alternative is 'subjectivism', which is based on an anti-positivist epistemological approach and a nominalist ontology. There has been much made of of this subjective-objective dualism in the Information Systems literatures (see Walsham 1993a, ch 1; Hirschheim & Klein 1989), which are (in part) derived from critiques of positivism. In such literature, subjectivism is seen as more appealing as a basis of epistemology.

For these reasons any 'subjective' account, needs to 'rescue' itself from the problems of subjective epistemology because of the reasons already outlined. Thus Habermas thus has the concept of 'ideal speech' which produces 'consensus' without coercion, distortion or duplicity. Checkland (1981, 1990) talks of '*accommodation*' of subjective accounts through conceptual modelling. Giddens(1984) recognises dualities of signification and communication (in a pseudo-postmodern manner (see Mestorvic 1997)) whilst recognising the related dualities of domination and power, and legitimation and sanction. However, any of these positions can be problematic in a 'purist' sense not least because of the difficulties of subtlety and insidious nature of power relationships: the constructs themselves are subjective and any analytical position can imply some sort of 'neutral' adjudicating role of

knowledge by 'rational' investigators. The role of these theoretical structures in defining a reality is perhaps not seen as such in much of the Information Systems literature. Those that claim in-depth 'knowledge' should not also claim 'objectivity'; perhaps only 'cultural overseers' (Rorty 1979, p. 317). This is in fact a 'pragmatic' position, accepting subjectivism in an ontological sense and 'rescues' itself because of the consensus of those involved. This 'pragmatism' leads to the notion that knowledge should be justified if it is supported by the consensus of people in a specific community (Rorty 1979, p. 173).

It seems that the subjective-objective duality of the Burrell & Morgan (1979) model remains problematic: either writers need to embrace the objective by development of 'observation neutral' theories, or adopting a subjective position which results in uncritical relativism. Thus philosophically, the subjective-objective has significant problems if any theoretical position does not open itself up to critical self-reflection. This is explored in Checkland 1985, where learning is the outcome of critical reflection on method and problem situation. In doing so, it avoids the 'objective' in a purist sense, as conclusions are subjected to critical reasoning processes.

Yet these are problems which are opened up by dogmatic adherence to any one 'paradigm'. Chua (1986) argues that the Burrell & Morgan (1979) model tends to lead researchers to seeing their 'truths' as relating to the researchers own paradigm where there is little opportunity for alternate evaluative criteria, creating incommensurable 'camps'. This results in two reactions in researcher approaches. On the one hand the suppression of philosophical issues, in which the researcher undertakes a rather fanciful empirical approach (ie with little or no discourse on epistemological assumptions), which is rather unreflective; or on the other, a lack of confidence with empirical work, driving the researcher into a theoretical and philosophical discourse without empirical work (see Sayer 1984, pp. 48).

It is therefore the maintenance of a pluralism in method, (for example 'triangulation' (Denzin 1970)), which maintains and recognises the limitations of the claim to 'grand' theoretical 'correctness' in an absolute sense, and also one which emphasises the need for critical reasoning developed in the observer and the observed.

SEARCHING FOR A GUIDING RESEARCH PROCESS FOR THE CURRENT WORK

The separation of ontology from epistemology is the centre of some debate. For instance, Burrell 1983 criticises Soft Systems Methodology precisely for having a basic 'subjective' epistemology with a 'knowable' (objective) problem situation (ontology); similarly other writers on this philosophical point argue for the incommensurability of the Burrell & Morgan (1979) paradigm model, which sees the traditions of investigation as fitting into one of the four paradigms, assuming each paradigm have differing epistemological and ontological positions as depicted in figure 2.1 by Guba and Linclon (1994). Each paradigm has its own epistemological and ontological baggage and cannot move between paradigms (see Jackson & Carter 1991, 1993).

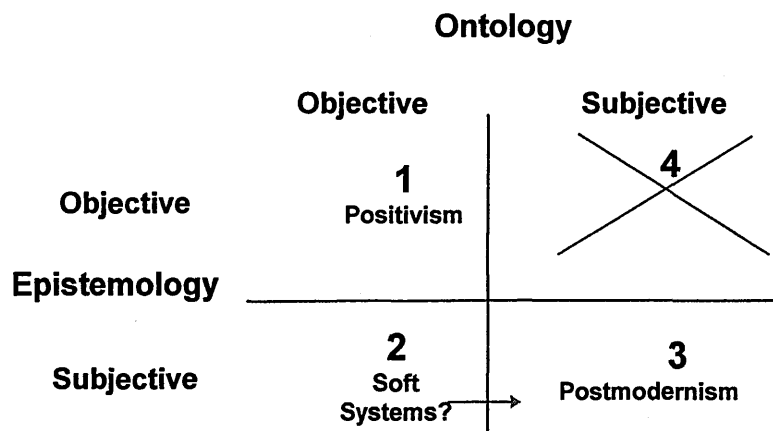


FIGURE 2.4: SOFT SYSTEMS AND 'OBJECTIVE' ONTOLOGY?

The separation of epistemology from ontology is done here in order to justify and clarify a perspective on differing philosophical approaches. For instance, Soft Systems Methodology might be seen to have a basic objective ontological position. It is a point of debate whether or not SSM indeed assumes such a position, and in the practice of SSM, alternative assumptions may be apparent by those undertaking an SSM study. Furthermore SSM is

perhaps better seen as an approach which itself has undergone on-going development. As mentioned Checkland 1985 sees the undertaking of an SSM study as a learning experience on the part of those involved in the problem subject (including researcher); learning is involved in solving problems, and about the validity of the frameworks used in analysis on the part of the researcher and on the part of the subject. This is a recognition that the world is not 'knowable' in an absolute sense, and is encapsulated by the notion of an SSM study as an intervention (mode 1) or as an interaction (mode 2) (Checkland & Scholes 1990). Users of SSM who often assume 'objective' ontological position as objective with an epistemology as 'subjective' as depicted in figure 2.4. (Vidgen 1995). This is not necessarily surprising as SSM has derived from the need in the *natural sciences* to view phenomena in a rather holistic manner as well as its component parts. See for example Checkland 1981, Weiss, 1969, Bertalanffy, 1968. Systems thinking has derived from the need to view the characteristics of and between such holons, and SSM recognises the need for a qualitative approach to analyse and the construction of such 'holons'. This necessitates the investigation of the individual *weltanschauung* of the stakeholders: each construct the 'holons' in potentially a differing manner, and by investigating such constructions learning about the 'problem situation' can follow (Checkland 1985). It is in the history of the development of SSM, which gives it an ontological 'objective' feel.

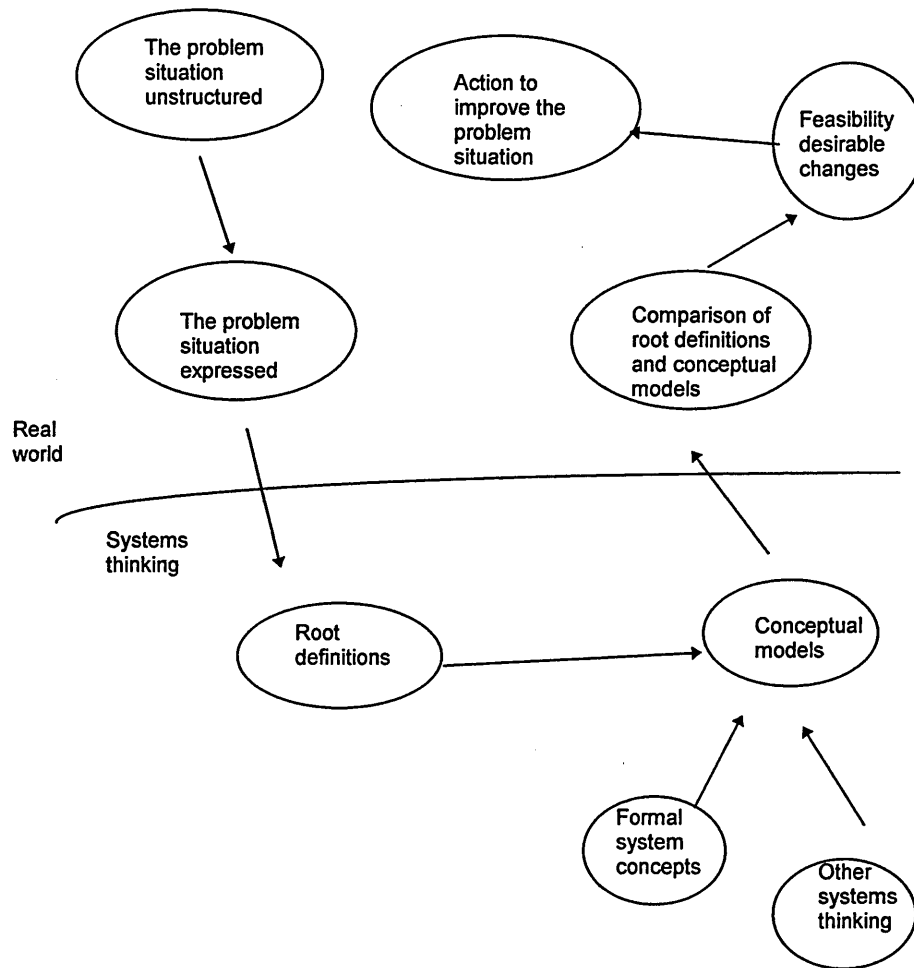


FIGURE 2.5: SSM IN SUMMARY (AFTER CHECKLAND 1981, PP 163)

The very distinction between the 'real world' and the conceptual modelling suggests that in the earlier version of SSM, a very distinct ontological realism. This is not necessarily a problem, depending on the research question, and has great strength. Yet it is important that the researcher assumptions are explored. Indeed, it is this ontological assumption which necessitates the development of the above discussions on the relationship between ontology and epistemology, and the impact on research method. The relative strengths of differing research methods and strategies are articulated in the following section.

Soft Systems Methodology (SSM) has gained a reputation for being effective for use in action based research, learning and problem solving. The work in this field has been innovative in many ways, not least because its evolution has bridged the gap between the research oriented towards the natural sciences and now is seen to embed itself into the

'interpretive' sociological paradigm (see Walsham 1993a, p.10). Yet its relationship between other research methods has not been sufficiently developed for scientists to articulate easily its relative merits, and its relationship with other approaches to data collection and analysis. It is of some importance to question the relative strengths and weaknesses of SSM, and contextualise its applicability for a variety of research questions. In particular, its strengths and weaknesses on the questions posited by the current work:

- the motivations of information technology users in everyday 'interventions' in perceived information problem solving;
- the question of how *evaluation* of 'end-user' application of technology is undertaken: this is both important at a methodological level, which will impact by informing some aspects of Information Systems practice;
- the changing role of the Information Systems specialist in enabling 'effective' technology *and* information utilisation in circumstances where non-Information Systems specialists *directly* apply technology for information purposes.

Indeed discursive debate on the scientific application of SSM to human problem solving has provided a vigorous and appropro debate (see for instance Burrell 1983, Jackson 1982, Checkland 1982, Brown 1992, Kreher, 1993, Avison *et al* 1993, Romm 1995). The relative merits of SSM has been discussed widely, though as yet little pragmatic guidance for the novice researcher has emerged, which can articulate and embed SSM within the social sciences. The *raison d'être* of the current section therefore is to debate this perceived gap and to give reasons for the use of Grounded Theory. Indeed if we are to attach any level of validity to socially oriented research, then the approach to research is paramount and thus the methodological debate is of key importance.

Thus a theoretical decomposition of SSM is given. It starts with a comparative analysis of SSM with Grounded Theory. It then focuses on the research *process* inherent in SSM, analysing its method of data capture, its reasoning strategy, and as a *sociological* construct which is capable of analysing the dynamics of 'human activity systems'. Juxtaposed are two sociological themes from Garfinkel (1967a, 1967b) and Giddens (1984) and comment is made on the limited nature and assumptions of *any* tightly defined method in research. The conclusion is that SSM has major and obvious strengths. Further, it is of obvious

importance to Information Systems because of the close relationship between information and human activities (Checkland 1992). It argues that SSM can be seen as one element in a number of approaches which can be user defined and applied; its structure to either enhance reasoning strategy or process of research is neither a good nor bad thing and is contingent on *both* research question and on the researcher, though reflection on strengths, weaknesses and key assumptions is a key to good qualitative work. Developing on this, SSM makes some implicit assumptions which need to be questioned: it lacks focus on on-going interactional sequences which can give insight into behavioural patterns that to some extent determine and/or explain human action. Whilst it can be seen as ethnographic, it is not the same as dominant social theory (Garfinkel 1967a). In this way it inevitably should be seen as not a ethnographic approach, but one which *may* be complimented by ethnographic type study. However, this point alone is contentious, as the study of 'holons' and conceptual modelling can itself compliment analysis of the ethnographic type studies (see Checkland & Scholes 1990, p. 282). Furthermore, its strength is in action research and problem solving rather than at the level of generalisable theoretical construction.

SSM & GROUNDED THEORY

In order to interpret the key characteristics and fundamental tenets of SSM, Grounded Theory is used in this section by way of comparator. The use of grounded theory has not been plucked out of the air without consideration, nor on the assumption that it is in some way better than other approaches to scientific inquiry. It has been chosen because it has been a dominant paradigm for social research, and as such is used here to help shed some light on the validity of the science embedded within SSM. Further, the reason is that it is seen in some ways as quite different from SSM in history and philosophy, and this can have important implications. For example:

- Is it for instance a approach suited to 'action based' or 'pure' research?
- Is it oriented towards solving managerial problems or to help explain social phenomena?
- Is its epistemology dominated by a sort of negotiation of meaning attachment between stakeholders, observable everyday occurrences, language or semiotic approaches?
- What are the relative levels of skill needed by the researcher?
- What are the predominant theoretical constructions which the observer uses to shed light on the data (empirical - theory relationship).

- Is the key objective to develop theory or validate action to 'improve the situation'.
- Is it a useful method to analyse everyday action?
- Is its goal some sort of generalisable theory?

i. Method and methodology

Yet in order to proceed with an analysis of SSM and Grounded Theory, it is necessary to clarify a number of points. It is of obvious importance to question whether or not the two are comparable at all. Of course the terms 'method' and 'methodology' are commonly used synonymously, but strictly speaking they are very different (see Stamper 1988). Jayaratna (1994, p.37) argues that 'methodology' must have '*....a structure to demonstrate its coherence*' and thus it should have a problem solving intention. Jayaratna (1994) goes on to argue that as such a methodology should have a number of differing phases: i. Problem formulation; ii. Solution design; and iii. implementation phase. If this definition is accepted then Grounded Theory is not 'methodology' because it generally is considered an approach for analysing empirical data (as in ii and iii). However, analysing empirical data is important in 'problem formulation' as it is in 'investigation' in research approach. Whilst Grounded Theory does not attempt to 'problem solve' in an explicit sense, analysing empirical data can lead to 'better' understanding and is encapsulated in the theoretical positions that are subsequently developed, with the result that there is greater opportunity for effective 'intervention'. Thus 'methodology' is a critical issue for a number of reasons:

- It has focus on 'structuring' thinking and actions. Both SSM and Grounded Theory have (differing) approaches for doing this.
- Methodology also reflects particular epistemological assumptions. SSM is much more explicit regarding its 'epistemological' application (See Jayaratna 1994, p. 41). However, Grounded Theory itself reflects the difficulties in interpreting qualitative data, with the perspective of the interpreter or researcher, and that of the subject, which are seen as difficult to separate. There are two important issues need to be considered. Firstly that epistemology is not as explicit in Grounded Theory: it is possible that a rather 'positivistic' or 'objective' epistemological stance could be taken in 'grounding' qualitative data. By the process of open and axial coding, and category development, there is a danger that the research is 'objectified' without critical or discursive reflection. Thus, there is an implicit

assumption that using Grounded Theory can provide an approach to data interpretation which produces increasingly 'better' data - or more 'objective' data. This is synonymous with an 'objective' ontological position, in which it is assumed there to be a 'theory neutral' observational language in collection and thus data analysis.

Thus the researcher needs to be sensitive to the limitations of *any one* interpretation: that is to say that the skill of the researcher is in the ability to reflect on assumptions as much as it is about seeking 'new facts' - which is the traditional scientific approach.

ii. History and roots of the two approaches

The most obvious area of difference is in the history of approach. The thinking of SSM has derived from the need in the 'natural' sciences to view phenomena in a rather holistic manner as well as its component parts. See for example Checkland 1981, Weiss, 1969, Bertalanffy, 1968. Systems thinking has derived from the need to view the characteristics of and between such holons, and SSM recognises the need for a qualitative approach to analyse and construct such holons. Grounded Theory has developed from the complexity, diversity and sheer volume of empirical data derived from studying social phenomena and everyday affairs: its history is in an attempt at interpreting meaning and generalisable theory from such data. In other words, it is possible to induce theory from observable social phenomena, and the research procedures specified in the grounded approach will enable its verification (Glaser & Strauss 1967). The humanist origins of Grounded Theory is very different from the analysis of 'systems'.

Since SSM and Grounded Theory have such fundamental differences in general approach, they are obviously not directly comparable and for analytical purposes, the two are characterised below. Such characterisations can impose a structure to help disentangle some of the complexities in the two. Whilst attempting to genuinely reflect the fundamental approaches in a clear fashion, it is recognised that this is an impossible task with any level of 'objectivity'. Thus is argued that it is only one interpretation and yet is necessary for the enhancement of subsequent debate.

iii. Towards the 'essence' of SSM to guide research approach

The version of SSM used here reflects Checkland 1990, though primary reference has also been made to Checkland 1981, 1982, 1985, 1992, Lewis, 1992, 1994, Winter *et al*, 1995, Davies & Ledington 1991.

Philosophically, 'systems' are said to be a model of an entity which stems from the need for holistic analysis of phenomena; this is a movement away from reductionist approaches in scientific method (Checkland 1981). In SSM the starting point is the concept of 'problem'. The problem is a problem when it is identified by more than one 'actor' close to the perceived problem domain. Subsequently relevant 'systems' to the problem are identified for investigation. When applying the systems concept to human activity, then such systems can be characterised in terms of hierarchy, emergence, communication and control. Problems to be investigated are selected by the observer by interviewing and discussion with key individuals and/or groups close to the perceived problem. The use of metaphor has been used to aid this process. Further analysing information such as written accounts of structures and processes may be included with the ultimate objective of defining and agreeing 'primary task' and 'issue based' human activities. Indeed, the principle objective in SSM is oriented towards human activity systems which do some sort of transforming process, and as such have some perceived purpose, and hence the use of the term 'systems' to help conceptualise these.

Naming the relevant 'systems' is sometimes referred to as providing root definitions of some of the purposeful activity systems. The root definition should express the transformation process of the human activity system. What is 'transformed' is dependent on the human activity. In doing this, the customers, actors, transformation process, weltanschauung, owners and environmental constraints (CATWOE) is an SSM construct that is normally applied. Modelling the transformation process is done by breaking down into 5-9 activities the transformation process. A 'rich' diagram which captures key metaphors to depicts the before and after context (Lewis 1992). Further analytical breakdown is suggested by conceptualising the transformation process using the terms 'efficacy', 'efficiency' and 'effectiveness'. The models need to be compared with 'actors' perceived realities and this may utilise one or more tools (the most common being formal questioning). The models are refined and accommodation is made between key interests in the situation.

Cultural inquiry is important to modern interpretations of SSM. This type of analysis is to take the root definitions and contextualise key cultural issues. Rich pictures are used to convey the ‘...*feel of the situation* ...’. Checkland (1990, p. 45), or some pattern of culture. Three sets of analysis (one, two and three) are seen to follow. An analysis of intervention (analysis one) is designed to clarify the roles of *client*, would be *problem solver* and that of the *problem owner*. The social infrastructure (analysis two) is analysed in terms of roles, norms and values. This is derived from a softer interpretation of unfolding events: it is not *what* people say, (as official myths and assumptions are given), but an analysis of key roles, norms and values. The political infrastructure (analysis three) is seen as the process by which different interests are accommodated. This is the process by which *order* is maintained. The focus of this type of study is on aspects which are affected ‘commodities’ (Checkland & Scholes, 1990, pp. 50-51; Stowell 1989): formal authority, intellectual authority, personal charisma, external reputation, commanding access or lack of access to important information, membership of various committees.

Making systemically desirable and culturally feasible changes are seen as meaningful, and are often interpreted to be the key objectives of an SSM study. Yet this is sometimes misguided: this is perhaps to misrepresent its emphasis on learning, rather than on perfecting answers.

iv. Characterising Grounded Theory as guiding research approach

The key text for the following synopsis is Glaser & Strauss 1967, though reference has also been made to Turner 1983, Martin & Turner 1986, Strauss 1987, Glaser 1978, Strauss & Corbin 1990, 1994, Dunn & Swieczek 1977, Bloor 1976, Bloor 1978.

The aim of grounded theory is to develop a theoretical construction which is applicable and generalisable. The word ‘grounded’ is to emphasise that ‘...*the formal theory we are talking about must be contrasted with “grand” theory that is generated from logical assumptions and speculations about the “oughts of life”*’ (Glaser & Strauss 1967, pp. 34-35). It is in effect a way of approaching research in order to investigate *everyday occurrences*, to interpret key occurrences, and using such findings for comparative analysis on existing theory. The Glaser & Strauss (1967) approach lays heavy emphasis on the difference between formal (based around a conceptual area of sociological inquiry) and substantive (based on substantial empirical work).

Ethnographic study, and the direct gathering of data is of prime importance, to the 'substantive' theoretical constructions. The elements of the theory are conceptual elements (and properties), and hypotheses or generalised relations among the categories and their properties. Thus grounded theory *"...is an inductive, theory discovery methodology that allows the researcher to develop a theoretical account of the general features of a topic whilst simultaneously grounding the account in empirical observations or data"* (Martin & Turner 1986, pp. 141).

With this as the goal, particularly at the early stages, selecting data for a category that has been established can tend to hinder the generation of new categories: in these cases the data is selected rather than generated. It is less creative and has less dependence on the constructs developed by the observer. There is also the danger that observations or data, may not fit previously defined categories. As Glaser & Strauss 1967, pp. 37 put it:

"An effective strategy is, at first, literally to ignore the literature of the theory and fact on the area under study, in order to assure that the emergence of categories will not be contaminated by concepts more suited to different areas. Similarities and convergencies with the literature can be established after the analytical core of the categories have emerged".

Generalised relations between categories are seen as hypotheses, and the research is increasingly able to discern important data elements, categories and relationships. The hypotheses are seen as evidence to make such a relationship, rather than building huge levels of data to prove it. Indeed this can be seen as a hindrance to the development of integration of key linkages which in turn forms a sort of integrated theoretical construct.

Of course, whilst the goal of Grounded Theory is to generate theory based on empirical evidence, it is seen as naive to suggest that advocating a Grounded approach is necessarily to start with a *tabula rasa*. This is seen as the researchers 'theoretical sensitivity', which stems from his/her own experience, approach and culture. The questioning of assumptions based around these are seen as increasing the theoretical sensitivity of the observer, (see Strauss & Corbin 1990) sensitivity to literature has a key role to play. 'Theoretical sampling' is to aid differentiation between categories, extend and enable confidence in the relationships between categories. It is a continuous effort *'...to relate existing concepts, methods, and practices such that "experience" in its widest sense becomes available...'* (Dunn & Swieczek, 1977). As will be seen, this thesis takes issue with some of the dangers of the empirical approach for the novice researcher.

v. Discourse on the 'system' in guiding the research

At the heart of systems thinking, there is the idea of the 'system' itself. This is seen as modelling of 'holons', and when applied to human activities, which display the characteristics of hierarchy, emergence, control and communication (Checkland 1981, pp. 74-92, Checkland & Scholes 1990, pp. 18-19). The arguments for such a construction is articulated in the development of western science (Checkland 1981), and has been found important by its utility. The theoretical basis upon which it is constructed gives a certain legitimacy for 'holistic' thinking which moves beyond the more general reductionist principles that has played a key role in some scientific disciplines (see Checkland 1981, pp. 105). Categories derived within the coding elements of grounded theory are also identifiable 'holons' in a loose sense. However, this is not to say that they are in any way interchangeable concepts. 'Categories' are akin to 'groupings' of observed phenomena and do not relate strongly to the notion of human activity 'holons'. Further, categories are not explicitly modelled, unlike 'holons'. Categories may or may not have dimensional characteristics, such as emergence, hierarchy, communication and control, but this is not explicit. Thus Grounded Theory is rather 'looser' than SSM in method. In order to discuss this issue further, characterisations of SSM and Grounded Theory are further developed and compared with other aspects of socially oriented approaches.

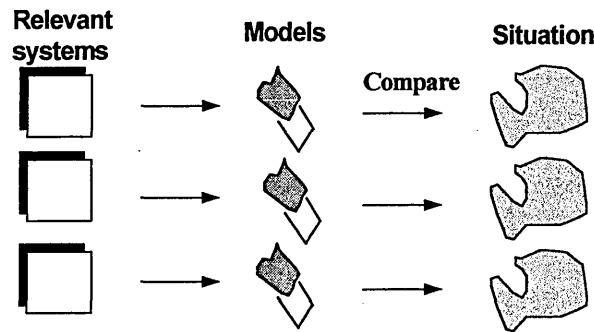


FIGURE 2.6: A CENTRAL ELEMENT OF THE PROCESS OF SSM (AFTER CHECKLAND 1990, P. 29)

In figure 2.6, the 'relevant systems' are representations used for investigating human activity systems to be investigated and which are significant to a problem domain (identified by more

than one person). Further, on initial examination, there is a clear demarcation assumed between the data of the real world (depicted in the conceptual relevant systems), 'captured' by the models of those systems. In both grounded theory and SSM models are used as frameworks of analysis (akin to 'retroductive' logic in social science (Bhaskar 1979, p. 15)). However in social approaches, models do not have such a clear role in 'comparing' with reality: rather they have a little more dynamic relationship to data, in that they can be used to *create* a reality. There is a subtle, but significant difference in emphasis, which indicates a difference in ontological stance. In SSM studies, it is commonly assumed that the model is used give perspective on the data, and at the same time validates (or otherwise) the model: it is easy to see how a lack of reflectiveness can follow, on the meaning and the social imposition of a created reality if this particular ontological stance is taken.

Figure 2.7, represents a conceptualisation of the interactive nature of data-theory relationship. In this way the conceptual model (via instrument used) *determines* the data being used and selected. Further, the framework may be modified as a result, and the whole process is a contribution to theory development.

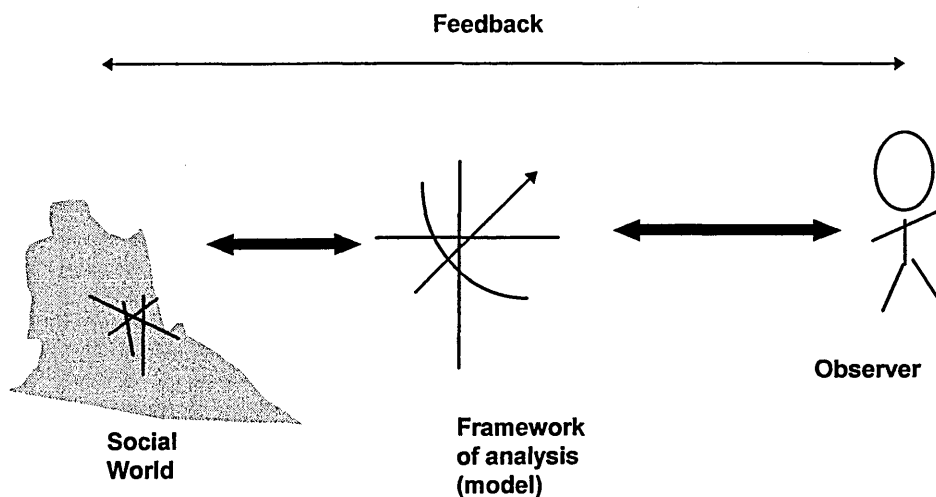


FIGURE 2.7: THE INFORMING ROLE OF THE THEORETICAL FRAMEWORK

Drawing comparisons between systems models in SSM and conceptual frameworks for analysis in social theory is rather crude. However, each are fundamental to the way the observer encapsulates reality, and thus has high impact on what is observed and analysed. Further, whilst not wanting to appear over-simplistic or over deterministic in the way SSM is utilised, it might be argued that comparing the two reveals some interesting differences. Firstly, and as already developed, Sociology does not tend to conceptualise 'systems', which is fundamental to SSM; the process of SSM would go on to conceptualise changes which are 'systemically desirable' (Checkland and Scholes, 1990, pp. 29). The 'system' is a device to transfer '*...systemicity from the world to the process of inquiry into the world*' (Checkland 1983, pp. 672), and therefore is a structure which guides the researcher. For instance, users of SSM are 'guided' through some of the constraining forces to intervention - the social *system*, the political *system*; we look at the real world problem situation through relevant '*systems*' and changes that are *systemically desirable*. At each stage, the human activity systems can be analysed using the four dimensions of systems - hierarchy, emergence, control and communication. Secondly, the orientation of SSM is on problem solving, and therefore SSM is much more explicit about the intervention/interaction process. Contrasting this, the key goal of grounded theory is generating theory from data - or *understanding* of observed social phenomenon. Its goal is not necessarily problem solving, but generating theory; problems can be conceptualised and subsequently 'solved', and in some interpretations of grounded theory, this takes a higher precedence in key outputs (see Strauss & Corbin 1990, pp. 146). In its strictest interpretation, SSM may be seen as an approach for *problem management*, rather than analysing social phenomena (see also the discussion by Burrell 1983 pp.125). Thirdly, the validity of findings within SSM are based on the comparison between the models and the 'situation'. Yet here is a fundamental difference: what is the 'situation'? Should we use a Critical, post-modern or other perspective in defining that 'situation', or to add to the dimensions of the problem situation. The fourth difference is that of validity: in SSM, if the models reflect an interpretation of the situation as perceived by the multiple stakeholders ('Pragmatic' position), then of course the model is in some way validated. In grounded theory, the validity is the '*...theory as process.*' (Glaser & Strauss 1967, pp. 32); the interpretation is the documentation, rigour of the process and the reflective depth of observation is that which ultimately contributes to the validity of theory construction. This itself gives it a look and feel of 'objectivity' in ontological terms, though is dependent on the approach of the researcher.

The above represents some significant differences; and yet both SSM and Grounded Theory recognise that the results *interpret* some element of the social world. Indeed, in SSM the statement that the 'real world' is compared with the model, is arguably a little paradoxical (perhaps a bit of a hangover from SSM's natural scientific roots). This is a quote from Lewis 1994, pp. 40, who describes a highly nominalist epistemological position for SSM, and thus in order to understand the actions of human beings, it is '*...necessary to investigate those meanings and the values which give rise to them, and in any study of human organisations the meanings created by those involved and the perceptions which arise from them cannot be excluded from the analysis.*'

Grounded theory does not suggest nor discount the relative merits of using such a conceptual construction such as 'systems'. If we take grounded theory as a way of developing theory from data, the utilisation of a construction such as 'system' only *might* be perceived as useful in the course of theory development. Perhaps this is best seen as both strength and weakness: strength in that it is less confining for the researcher to create and develop his/her thinking without reference to specific constructions. This is seen as particularly important for the novice qualitative researcher, whose excursions into a particular subject domain needs to be a rich and creative exercise where appropriate perspectives and opinions can be developed with minimal 'baggage': it allows for a creative excursion. However, it is also dangerous, in that it may result in research being undertaken without awareness of the processes and influences on the constructions developed. Indeed, such 'creative excursions' are not always applicable. Time constraints may mean such an approach is unworkable; ready made conceptual constructions may enable speedy and effective analysis dependent on research question. Indeed, the most commonly cited criticism of grounded theory is that it lacks structure which can impose a framework for analysis. Unlike SSM.

Yet it is best not to have an overly entrenched position on this, but to recognise issues in the process of research. Grounded theory indeed imposes little structure and this is the most commonly cited criticism. It is indeed unworkable to suggest that a researcher starts with a kind of *tabula rasa*. However, it might also be best seen as a *tabula rasa at a conscious level*. For instance at the outset of a particular study, the observer may not necessarily be conscious of some of the conceptual ideas and structures being utilised (see Glaser 1978, p. 56-72; Glaser & Strauss 1967, p. 106-107; Strauss 1987, p.58-64). The early stages of a grounded approach is probably best seen as a creative excursion into data with greater or lesser levels of theoretical insight (see Glaser & Strauss 1967, pp. 252-253). The process of gaining

dimension into key issues and findings extols the ultimate need to be able to articulate the perspective and theoretical frameworks and assumptions which enables the analysis of key sets of data: an inductive reasoning strategy can be effective in solidifying research question and associated observer (sub-conscious) assumptions. The qualitative researcher can use inductive reasoning strategies to allude and expound (for instance) the 'systems' theoretical construct, apply and assess its semantic qualities and use it as a qualitative device for attachment of meaning in the process of qualitative study. SSM may be seen as a shortcut which is appropriate depending on research question (as depicted in the three categories of research in Ramenyi & Williams 1995), and/or researcher experience. The conclusion must be then for plurality in method, the ability to mix and match depending both on research question and based on the experience of the researcher, whilst recognising the strengths and weaknesses within any one approach. Most of all perhaps, within any one approach, the observer should be reflective enough in his/her appreciation of assumptions taken.

vi. On the qualitative research 'process'

Developing on some of the key differences as developed in the above section, attention is now turned to the respective procedural frameworks. Both SSM and Grounded Theory have a process which the observer follows, in order to make some set of conclusions. Both consist of a loose or more defined set of procedures, and some suggested capture and/or analytical instruments. The procedural framework tends to be a well defined focus in SSM because it is explicitly a problem solving approach: in its original version, SSM was perceived as having seven quite linear stages (Checkland 1981, pp. 163). This is reflected in Checkland 1990 (see page 62). However, the linearity is certainly emphasised less in the later version, which reflects the later emphasis on interaction rather than intervention (subjectivity in an ontological sense).

There are quite parallel versions and structures in the grounded theory literature. When compared to the earlier (1967) version, Strauss & Corbin 1990 tend to focus on far stronger procedural framework: open, axial and selective coding for instance are seen as presented in a rather linear manner. Glaser & Strauss 1967 on the other hand emphasise the constant comparative method where hypothesis analysis derived from qualitative data is achieved both after and during the collection (see Glaser & Strauss 1967 p. 102). The presentation of a linear procedural framework is not a central or immediate characteristic of the earlier version of grounded theory. Indeed, this comparative method might be best seen as an

iterative irregular process of constantly developing and refining key variables and ideas around the research question.

In neither case (SSM or grounded theory) is the framework or research 'process' seen as a prescription by the authors. Yet it is still seen as having potential impact on epistemology. For instance, when is the qualitative data analysed? Is it codified and analysed after the event (an approach sometimes depicted by over formalising the qualitative research process (see Easterby-Smith *et al* 1991 on content analysis, pp. 106)) or during the process of capture or both (as suggested in the original Glaser & Struass 1967). When data is analysed is important as it has impact on the qualitative research process itself. For instance, are the key variables, issues, characteristics being observed constantly changing as perceived by the observer. Particularly during the early stages of an investigation, the frameworks of analysis may not be as easily applied and developed as at the later stages, and thus an inductive reasoning strategy seems more appropriate. The corollary position would assert that deductive approaches assume a more stable investigative domain, which might result from the experience of the researcher and/or the research question itself. There are a number of issues that are raised by this. Firstly, that SSM is unspecific about *some* elements (particularly timings) of qualitative data capture and analysis, whereas Grounded Theory is more specific (discussed below). Secondly, based on the assumption that where methodological processes are used by the observer (as presented in the method), then the analysis will follow broadly a particular reasoning pattern. Where it is not, then the approach will be more akin to the hypothesis generation (inductive) approach more akin to Grounded Theory. Thus where structures are presented, the research question is more easily bounded and stable. To lend insight into this perspective on method, further exposition of the SSM specific CATWOE construct, rich pictures, systems models and comparator matrices is made. Comment is also made of the more generic interviewing and observation techniques.

The characterisations given above in the above sections has developed some key differences between grounded theory and SSM. The first point to note is the data capture instruments and analytical devices used. SSM tends to be quite specific: the CATWOE construct for *eliciting* the root definitions of the transformation process are ensuring that the root definitions are complete. This construct is a sort of guiding principle for developing key attributes of a system. Yet it is a construct which may be seen as an imposition which might be deemed helpful or otherwise, dependent on context, and as such acts as an influence on

the observer. This in turn plays a part in his/her conceptualisation of the problem domain. Yet it is a construct which can be utilised as an imposed construct for effective elicitation.

The use of rich pictures can also be seen as primarily a conceptualisation device for the observer, though it also may be used for elicitation. This has been the subject of detailed debate in Lewis 1992. If it is the former, then the observer has freedom to express key issues in pictures, prose using mental constructs (highly inductive in creation of categories, linkages and characteristics). If it is the latter, then the lack of structure, the flexibility of its use can be seen as both strength and weakness, depending on the experience of the observer him/herself as communicator and sharer of ideas. Is it used to guide a relatively unsophisticated observer following a procedural framework (as in traditional information systems development method), or as an epistemological or heuristic device? SSM users argue that its central merit is in the contextualisation of the power, conflict and cultural issues. This has been the subject of sizeable chunks of sociology, and this is the subject of further analysis in the following section in this chapter. Alignment of these is of key importance in IS research.

Similar observations can be applied to the use of systems models as well as the suggested matrix for comparing conceptual models and the 'real world'. However, these are specific constructs which depend in part on the concept of 'human activity system'. As argued this is a pervasive construct in SSM and as such will act as a thought structuring device for the observer. Again, this might be seen as both strength and weakness depending on context, and it of course would not negate the idea that the basic construct might be used as a epistemological or heuristic tool. However, one further observation which is developed in the following section. How far can SSM be used for intervention in everyday action and the process of change? The question might be turned on its head: what are the relative merits of the matrix or comparison, to fulfil the depiction of the *changing* observer perspectives and/or the *changing* real world. Of course the question is rhetorical, but demonstrates perhaps the ontological assumptions in SSM (particularly in mode 1).

Observation and interviewing are key devices which might be seen to an extent as continuous. In SSM their use is explicit when identifying the systems relating to the perceived problem domains. The use of metaphor and systems models may also be used as devices to extract data, and analyse it. It is an interesting question whether metaphor and models are used to represent the world of the observed or to influence (or enhance) their

perceptions (see Morgan 1993). Further, there is little in SSM which would suggest the level of deduction/induction in the process of data collection and analysis. Yet grounded theory advocates an overtly inductive approach via a number of differing types of coding: Open coding, Axial coding, Selective coding (Strauss & Corbin 1990). These are central to the analysis of findings in a qualitative investigation. Types of coding can be mixed and matched, but categorising them depicted by Strauss & Corbin 1990 may enhance discussion and understanding: the observer-observed relationship is seen as dynamic rather than being a capture device of a perceived real world at one moment in time. It is pertinent to question the level that the method being applied results in an oversimplistic 'snapshot'. Again, this will to some extent depend on the researcher, though it seems that procedures cannot be applied mechanically: an algorithmic approach to the complexities in investigative work in organisations cannot be any guarantee of developing effective understanding.

In this way grounded theory has been found useful as it enables the observer to focus on the everyday situations which surround human action and activity. In other words, a focused study on a particular social phenomenon in context, allows empirical work and observation with minimal imposition of theoretical constructs which surrounds the subject field, and/or research methodology. Of course this in itself can be accused of a rather naive approach: minimal theoretical structure imposition on empirical data could be seen as synonymous with weak focus and a tendency to gather irrelevant data. Further, as its focus is on a particular context it has been naturally used in single case studies (see also Vitalari 1985). It thus can be accused of a focus on over particularistic characteristics: on variables which are applicable only to the local context. However, certain writers have suggested that more general explanation can be produced from these types of studies (Eisenhardt, 1989; Leonard-Barton, 1990; Dutton & Dukerich, 1991). Yin (1989) for example, refers to this process as "analytic generalisation" (which contrasts with the statistical generalisation in more quantitative studies). However the debate here centres on the argument that building generalisable theory from a limited number of cases is susceptible to researchers' preconceptions or peculiarities of the case. Of course, this could be a valid criticism, but in individual cases may be refuted in the actual method adopted by the researcher: it may be argued that indeed the opposite is true. An iterative comparison between empirical observations, identification and explanation of issues that emerge, visiting different theoretical constructs and frameworks to elucidate observation is said to unfreeze thinking, and so the process has greater potential for generation of theory than a straight forward deductive driven theory (see Eisenhardt 1989, pp. 546). The conclusion that must be drawn

is that it must be contingent on research question, though it should be part of the reflective process necessary in the interpretation of qualitative data.

This sort of search for a certain creativity in research is not explicit in SSM (in mode 1). Whilst both grounded theory and SSM are oriented towards in-depth analysis of one (SSM) or small numbers (grounded theory) of cases, unlike grounded theory, SSM is not seeking *theoretical* generalisability. Rather it is seeking an accommodation of disparate perspectives and learning over an identifiable problem domain. The reasoning strategy of SSM centres around modelling. Unstructured modelling (rich pictures) which serves to abstract features of the problem domain is followed by formal textual modelling (root definitions) and activity modelling. Models are used as devices for reassessing and improving the problem solvers' interpretations of any given problem situation. This is a well-expounded 'research process'; however, since the methodology is targeted at action based research and problem solving, and not 'pure' academic research, there is no explicit logic of theory construction. The outcome of the SSM research process is learning (see also Checkland 1985). The forms of theory generation and testing which *have* been found acceptable have tended to be testing and developments of the methodology itself - CATWOE being a notable example. This is consistent with being a highly self-reflective action research approach. SSM 'holons' are conceptual products on the route to learning, and are a valid representational or heuristic account. Perhaps seen in this manner, SSM's reasoning strategy may be aligned with retroduction in Blaikie's (1993, pp. 162-176) taxonomic scheme (cf also Bhaskar 1979, pp. 15; Hanson 1965, pp. 85), which is best seen as a cognitive device similar to analogy or metaphor used in a dynamic manner to challenge researcher and his/her subjects. Thus compared with grounded theory, SSM offers a more limited claim: the models are not *explanations*. Rather they are systems-based constructs to be held up against the perceived world for the purposes of heuristics and ultimately for comparison. Such models are built to explain '*... some observed regularity*' (Blaikie 1993, pp.172) and '*... use approximations, omit complicating factors, and introduce idealised relationships.*' (Blaikie 1993, pp. 171). Theoretical construction in grounded theory are based around empirical observations where models may be seen of some assistance.

vii. SSM and everyday interactional sequence

Broadening the debate however, it is worth investigating and contrasting further relevant social theoretical constructs which are not found in the SSM or in the grounded theory literatures. This will give a flavour of some of the limitations of both, and to convey the idea that even if the strengths of both were combined (Brown 1992, 1993; Kreher 1993, Avison *et al* 1993), there still may be analytical limitations to the research outputs. Two key interrelated sociological themes are briefly developed which exemplify the analytical limitation of an approach such as SSM, and linkage is made to some of the strategic constructs pervasive in the wider IS literatures. For instance, Garfinkel (1967), Garfinkel and Sacks 1970 questions the notion of rational action in everyday affairs See also Garfinkel 1988. It means that it is not possible to rationalise using clear cut means-end criteria to explain social conduct in everyday affairs (see Heritage 1984). Motivated action of individuals is interpreted by the observer and are normally different to that of the observed themselves. Thus means-end criteria as an explanation of social conduct results in the idea that much of human activity is irrational action, and that perceived rational actions are of a relatively minor consequence. Garfinkel distinguishes rationalities which are relevant to *day-to-day life* rather than to those of *science*. Precise definitions, generalisability and objectivity are key concerns of science, but are not of major significance to lay actors. The lay actor orders his experience to support the supposition that the world is as it appears to be. The scientific observer suspends the idea that things are as they appear to be. Garfinkel's main aims are not to explain and link motive to action, but is more concerned with how the realisation of a reality comes into being. Thus Garfinkel (1967, pp 1) proposes ethnomethodology as the study of how actors construct and manage *everyday* affairs. Social practices '*...are carried on under the auspices of, and are made to happen as events in the same ordinary affairs that in organising they describe*'. Thus the phenomenological emphasis on the primacy of reality which is separated from every day experience is discarded, towards the study of actions in differing situations, expressed by interpreted linguistic forms. It is perhaps easy for critics to claim that models built around retroduction reasoning are based on highly rational approaches which at the extreme (possibly when badly used) might be seen as over-simplified idealism. Seen in this manner, the main objective of SSM as *learning* device is the key to its validity.

Developing on the themes developed by Garfinkel, one of the key epistemological devices is through the language of everyday activities; this represents a construction of realities and the processes and actions of individuals in everyday affairs. The result is not an objective truth or reality, but depth of understanding in order to better conceptualise the effects of changes

made in any given social environment. A claim made also by proponents of SSM. Thus it is necessary to recognise the importance of qualitative technique, to analyse activities at an individual level, and to understand the meanings associated by those individuals' construction of words and conceptual constructs. Thus there results in some importance of grounded or root analysis in the examination of people's behaviour in order to build constructs, behaviour patterns or frameworks of analysis in a social world. However, in doing this, SSM in mode 1 may be accused of a sort of static reality which can be captured by the observer; the activity systems are generally seen as ones which can be *rationalised* about.

Further, the language used between both SSM user and key actors is commonly assumed to be understood. Such interpretations of the application of SSM results in a static type of analysis and can deal rather poorly with the complexity and dynamism of everyday activity. Here it may be also useful to operationalise theoretical constructs such as (for example) Giddens' (1976, 1979, 1984, 1985a, 1990) Structuration theory. This interprets everyday 'processual' sequences and seeks explanation of these within the constraining and enabling forces surrounding social structure at one instance in time. Giddens uses the term 'systems' to depict social structure which dictates or constrains action within the context. The context is a social context, and his analysis is derived from wide societal analysis, but it is proposal that the 'state' is a generic form of 'organisation' (1984, pp. 18) that enables the field of management to operationalise his thinking. The state is '*...a collectivity in which knowledge about the conditions of system reproduction is reflexively used to influence, shape or modify that system reproduction.*' The emphasis on knowledge and reflexivity is central to the argument that organisations can be moved in some coherent and explicit direction which enables a deliberate and effective strategy. In this way, Structuration Theory can be seen as having potential for the analysis of change. This is a move which might be seen closer but resisting the postmodern pessimism over deliberate human action for achievement of particular ends (cf Giddens 1990). However, control in organisation is never going to be complete resulting from the inter and intra organisation diversity (Giddens 1985a, pp. 186). The structure portrayed in Giddens's work is 'multidimensional' (Giddens 1990, pp.12), in which capitalist production is a complex and ephemeral cohesion where key social issues such as ethnicity, gender, knowledge and the state play a key conflicting role to generate structure. Such key issues, along with knowledge and reflexivity are the flashpoints which opportunise human agency. Thus Structuration is based primarily on the forces of such agency and interaction with social structure (see Giddens 1984). Further, social structure is itself guided by the 'big

picture' socio-economic system (cf Giddens 1984 pp. 256 - 262), in which and human agents are both enabled and constrained. Rules such as sets of procedures, techniques and norms are subject to this 'enable-constraining' dichotomy. Other dimensions such as resource allocation, empowerment, and guiding everyday action are also key aspects which can be easily subjected to this form of analysis. SSM may be best seen as a technique or device for conceptualising change to work activity systems, but it may be interpreted as very much subject to the constraining forces depicted as part of Structuration Theory (see Walsham 1993a, Walsham & Han 1991).

It is easy to see how the theories of Garfinkel and Giddens might be used to argue that SSM lacks 'process' or a focus on *everyday* human affairs in an explicit sense. However it will obviously depend on the way it is used (see the 'ontological' and 'epistemological' modes of inquiry in Jayaratna 1994). Perhaps this calls for SSM to be used in conjunction with alternate theoretical constructs derived from other disciplines. Yet even within the three 'e's' of SSM - efficacy, efficiency and effectiveness there is scope to expand into alternative constructs: the IS strategy literature is full of constructs may be used to evaluate 'effectiveness' for example. In this way, it is of key theoretical concern as to whether SSM can be used in such a way in a sort of triangulation of different philosophical perspectives. Or perhaps the question is best turned on its head: can the theoretical notions derived from social or strategy theory be incorporated into a simple method such as SSM in order to make them more usable and accessible to novice researchers and/or practitioners themselves?

CONCLUDING AND REFLECTING ON THE LIMITATIONS OF SSM FOR THE CURRENT RESEARCH

It is worth hypothesising how SSM may be integrated into a research programme containing other methods. It is perhaps of future concern how SSM might be further developed. Its strengths are for areas of action research with particular problem solving goals but also where the dynamics of everyday behaviours are not seen as central. However, it may also be used to compliment other findings (see Brown 1992, 1993; Kreher 1993, Avison *et al* 1993). Further, SSM may be seen as having a key strength as a problem-structuring tool. In this case it might be best used as a 'front-end' to wider research programmes in order to develop better research questions to be researched via other means. The pluralism of research

strategy depends on the research question and on the researcher, and is a conclusion that is congruent with the conclusions of others (cf Jenkins (1985)).

Yet it is one which has certain dangers without clarification of the strengths and weaknesses of the method being utilised.

SSM fits (only) reasonably comfortably within the traditions of social science research. It benefits by its distancing itself from desirable and idealistic change and towards learning and heuristics however (Checkland 1985). It is highly pragmatic and remains a thoroughly useful approach for problem solving and can be applied in a variety of ways (see Checkland & Holwell 1993). All research methods will have flaws and certainly inductive methods also have certain difficulties (see for example Popper 1959 pp. 27-32), but having an entrenched position is unlikely to be conducive to seeing relative strengths and weaknesses of any single approach. Yet for the current research question, which is seen as dependent on an analysis of everyday users and their motivations, actions, subjective accounts, it was decided that SSM as a guiding research process was not going to be used. It seemed at the outset that the focus on 'pure' rather than problem solving approaches were more appropriate, with an account of the subjective phenomenological worlds of subjects, was to inform the research question. However, it is also important to see current research as not a prescription of the 'right' or 'objective' in an ontological sense (seen at the outset as a danger in SSM), but an attempt to justify a particular theoretical position which can enable insight into the behaviours and motivations of technology users.

However, the goals and ambitions of the current work meant that attempting to operationalise inductive method was in fact highly problematic also (see Popper 1959, p.27-32), and this proved a key learning experience. The pure approaches to inductive method given in Glaser & Strauss 1967 and Strauss & Corbin 1990 lead to some problems, which were overcome by adapting the inductive method being used as argued by Bloor 1978.

The problems of a pure 'Inductive' approach for the current research

Whilst focus (above) has been on SSM as research method, it is not good enough to conclude that Grounded Theory offers necessarily a better or 'more complete' alternative. Nor is it good enough to over simplistically 'denounce' SSM in favour of something else. The iterative and reflective cycles undertaken within the current work has resulted in a

position which does not advocate a singular approach to research, nor 'exclusivity' of overriding research paradigm as described in the introductory section of the current chapter. Rather, it advocates sensible and mature evaluation, reflective learning and debate on the relative strengths and weaknesses of *any* approach for a particular research question. These types of debate are relatively immature in the discipline of Information Systems, and represents a position of subjectivity, not only in the observed, but also in the observer. From this there are two broad areas in evaluating the meaning and relative strengths and weaknesses of a research strategy based on a 'pure' inductive approach in investigating the questions posited by the current work

Firstly, whilst Grounded Theory advocates strong elements of subjective analysis in everyday social events, there remains analytical difficulty in doing so. This occurs on two levels:

1. that the qualitative research process has a particular construction which was being tested or applied within any one data collection exercise. Thus the data is never 'objective'; yet to assume that it ever *could* be would be akin to a post-positivist position as depicted in figure 2.1. This is something that could be criticised of the approach taken by many who operationalise Grounded Theory in an over simplistic fashion, with little reflection on assumptions made. Thus a more mature approach to inductive method depends not on the *tabula rasa* in any one study, but is a notion built on the idea that the qualitative research process is iterative and reflective, and the user of it needs to reflect on the value laden assumptions in data analysis and collection.
2. Singular highly analytical cases or studies have proved impossible, as the synthesis of a wide variety of issues is required. Construction of key points, categories or cause-effect relationships is a matter of selection. This selection must be done by the researcher in conjunction with the data. For instance, one of the points of the early studies suggested that 'users' had a wide variety of differing perceptions of the relative strengths or weaknesses of the formal information systems in any one context, and this was seen as having significant impact on the 'direct' technology application by the information worker and/or consumer. The point was that it was not that the information systems were poor, incorrect etc. It was the user perceptions of it were poor - and this often had a highly politicised or deep rooted explanation. This was developed in different cases, in investigating the contextual 'constraints' for users' perceptions. This simple point is not borne out of longitudinal or qualitative cases studies, but is encapsulated in simple responses to simple questioning,

subsequent reflection on making sense of responses, building argument and linkages to other findings and other theoretical concepts. The research in these types of areas is dependent on the subjective account of the researcher making sense of the subjective account of the subject. Yet sometimes research is said to be best done using specific instruments and approaches. Whilst this is no doubt true, it is also true that the skilled researcher should have the ability to pick and choose dependent on the question and other factors. Questionnaires may not be considered the sole domain of the 'positivist', just like 'analytical generalisability' is not necessarily borne out (only) longitudinal case studies (Yin 1989). Whether or not singular or multiple cases should be used, whether questionnaires or other devices (such as CATWOE) for guiding data capture, it is argued, depends on research question, and the perceived starting point of the researcher him/herself. And yet the volume of empirical data presents its own problems in terms of selection of key factors and thus of interpretation and of construction of argument.

Secondly, and more importantly perhaps, the inductive approach assumes that theoretical construction 'evolves' out of previous data collection exercises and linkage to related theoretical literature and frameworks. This was found not to be the case. It seems that at theory construction stage, two unconnected researchers focusing on the same research question are not likely to come to the same conclusions. There needs to be reflective incorporation of a theoretical construction, as well as a reflective account of the researcher at each stage. However, a more mature researcher in the field would be more able to identify such theoretical constructs at earlier stages of the research process. Thus the inductive-deductive dichotomy is not best seen as a singular process: rather it is like walking up stairs and then realising the need to walk downstairs simultaneously, and meeting somewhere in the middle. *When* this occurs is dependent on the researcher him/herself. Seeking an effective balance is the art of qualitative research whose output is assessed on its 'process', critical reasoning of the researcher and construction of argument, rather purely on its procedural framework (see also Hammersley 1992).

Thus in approaching the current work, an adapted inductive approach was used (Bloor 1978; also Bloor 1976) and is summarised below:

1. Build case notes and category development from empirical observation whilst developing a theoretical sensitivity for the area of study (chapter 3).

2. Reflection on some of the key findings and the assumptions made in deriving these findings (chapter 4).
3. Larger, in depth analytical case study with greater focus, to develop key categories, and to test and build on 1 and 2 (above). (Chapter 5).
4. Develop the case using a theoretical construct to increase sensitivity to the issues and constructions of both observed and observer. (Chapter 6)
5. Test the validity of the constructions by using observation on a separate case. (Chapter 6).

The approach was guided by the need to maintain a level of subjectivity to enable insight into the phenomenological world of the subject. However, because of the initial empathy with subjectivity in both epistemological and ontological terms, care was taken to recognise the subjectivity of the observer as well as the observed. Thus reflective accounts and notes were seen as important. Interpretive validity is an issue that has to be constantly questioned in operationalising such an approach (Atheide & Johnson 1994), and as such a highly reflective account is developed. This is important so that a-priori views are questioned (see Hirschheim 1986). Thus at all stages the data is reflected upon, and assertions and meanings questioned, and chapter 7 develops the themes and ties them together, and makes assertions on the implications.

CHAPTER 3

CASE NOTES AND CATEGORY DEVELOPMENT

Information systems vary enormously in the extent to which they rely on formal standardised and structured information-handling techniques as against informal, and often ad-hoc and subjective techniques.

Frank Land, 1986, pp. 11

INTRODUCTION

In the initial stages of investigation, it was expected that categories would emerge resulting from qualitative investigation of end-user applications of varied technologies. It was expected that from these, certain 'benchmarks' of 'effectiveness' could be derived. It was not quite as simple as at first expected, as it became apparent that any such benchmarks were highly ephemeral and depended on the *subjective* purposes to which technology was being applied. Thus it became apparent that it was necessary to recognise the distinct and identifiable *patterns of everyday* information utilisation and consideration of motivations in different contexts. The approach became an analysis of technology application aiming to 'discover' a higher level 'benchmark', towards an analysis of behaviour. This is a substantially different approach than was at first expected, and was the conclusion of the first stages of research as discussed in this chapter.

For clarity of purpose, the initial questions around which the empirical work is framed are reiterated here:

- the motivations of information technology users in everyday 'interventions' in perceived information problem solving;
- the question of how *evaluation* of 'end-user' application of technology is undertaken: this is both important in epistemological terms in adding to the discipline and also as impacting by informing Information Systems practice;

- the changing role of the Information Systems specialist in enabling 'effective' technology *and* information utilisation.

In order to answer these, the research involved developing initial empirical work, in order to develop insight into the key 'categories' and their 'dimensions' (Strauss & Corbin 1990), and became the first stage of the adapted inductive method derived from Bloor 1976, 1978). This involved analysing the patterns of information usage in particular contexts and testing some key premises:

- the ad-hoc nature of information utilisation;
- the serendipitous nature of decision making within context;
- the need for technology to be adaptable, and
- attitudes towards the central provision of information systems.

These are important questions, particularly when considering the post modern assertions that there have been increases in the levels of change in organisation (Clegg 1990). It is of importance to the current work to focus on change, and question the impact on individual behaviours and perceptions of information need. Three studies are included.

The first case focuses on the utilisation of groupware technologies. This demonstrated that information technology is not only associated with formal Information Systems designs. As already developed in chapter 1, classic papers such as Land, 1986 and Earl & Hopwood 1987 clearly demarcate between the formal and informal components at an information level. This has been a substantial shift, and directly impacts on the discipline of Information Systems, and the practice. As will be seen, it is argued that both discipline and practice tends to be dominated by some traditional assumptions based on formal designs and centralised technologies. The first case that is presented is derived from an analysis of Lotus Notes users at a large Management and Technical consulting organisation associated with British Steel UK. The second case juxtaposes an analysis of patterns of information utilisation by marketing managers (information consumers) at a number of Small to Medium Sized Enterprises (SME's). This takes the form of information designs which assume a certain utility based on 'rational' market planning processes. The case is also interesting in that those perceptions of need are often intransigent and inwardly focused, and may be usefully

challenged as part of a reflective learning cycle. However, challenging them results in questioning the 'expertise' of the individual concerned, and becomes threatening because of the role that 'expertise' has in the legitimisation of a particular role within organisation.

The third case study was designed to focus on the perceptions of changing need, and the impact it had on centralised database provision. This third case is taken from, a large pharmaceutical corporate, and user perceptions of some of the centralised provisions for information. This case is useful in the 'reaction' that users had to that provision, and also the resultant and mutual distrust between the Information Systems function and the 'users' of the applications.

As indicated in the adapted inductive approach (Bloor 1976, 1978), these enable the creation of a number of features and characteristics which are seen as common to each. This forms the basis of critique of the dominant epistemological assumptions in Information Systems practice. This is developed in the following chapter. The dominant assumptions are seen as associated with a particular scientific method which is seen as inappropriate for analysing the behaviours and motivations associated with information technology application by the end-user (chapter 4), and also gives insight into the 'lines upon which to look' in the following case study (section 3).

CASE 1: A CASE STUDY IN LOTUS NOTES IMPLEMENTATION : MANAGEMENT TECH SERVICES (MTS)¹

Grounded insights are gained by analysing the way in which process, co-ordinative and co-operative software is being applied utilised within organisations. The case that follows is taken from the experience of MTS who use and implement Lotus Notes. This product is interesting because it is able to provide data and information centred around informal groupings and informal co-ordinative functionality. The product might be seen as a sort of enhanced form of e-mail and data sharing mechanism for groups in a co-operative environment. Its concentration on workflow, and the automative/informative application of technology enables insight into the formal - informal divide.

MTS are a management service attached to a large British corporate based in the South Yorkshire area of England, UK. Thirty percent of its work deals with internal managerial and technical infrastructural issues of that corporate, and the rest is external consultancy work for a wide range of organisations nationally. It employs approximately 350 full time technical, business, management consultants and support staff.

Towards the end of 1992 MTS embarked on a major investment program to install Lotus Notes company wide, and subsequently became technical and business consultants to others investing in the product, and advisers on the business effect of co-operative and co-ordinative type products. Three interviews of approximately three hours on separate occasions were held in order to as far as possible qualitatively gain insight into way MTS staff utilise the product. Of course, interviewing is not the perfect research instrument, but did allow some key themes to 'emerge'. They were unstructured interviews had a broad set of guidelines in order that certain issues could be teased out. Each interview was taped and subsequently analysed. The technical issues and implementation considerations were not the main agenda. The idea was to understand some of the key issues and perceptions in its *everyday operations*, and to obtain empirical data on formal and informal components of the technology and information usage, particularly with regard to its co-operative as well as formal co-ordinative application.

The interviewees were middle ranking managers. Two were based in the sales section and the other was a cost accountant. All were in their early thirties with (seemingly) drive and ambition, and were on full time and permanent employment contracts. The interviewees were given a general indication of the purpose of the interview, but precise detail was not given in order that interviewees should not pre-conceive 'correct' answers: '*...to talk about how you are finding Notes - what you are using it for ...*'. At the outset, it seemed important to break interviewee perceptions that the researcher was associated with management and/or of the central Information Systems services. Thus it was emphasised to each interviewee of the academic nature and the confidentiality of the interviews. The interviewer attempted to extract information on their work and activities, and evaluate the perceptions of how the product added value of some sort and how it provided a means of co-operation and co-ordination between individuals. The interviews had a loose format so that issues could 'emerge' - as specified in the inductive approaches. Indeed, whilst some issues were specifically sought, others were not as expected.

A content analysis of each tape took place and some consistent and interesting points were derived (the strengths and weaknesses of Content Analysis for this type of work is explored later in this chapter). An interpreted outline of the important themes that resulted in the interviews are summarised below. The findings are presented as case notes and are summarised into five broad areas of interest each having a perspective on information utilisation. These are categorised in terms of cost/benefit analysis, use of traditional database, integration with end-user applications, groupware co-operation, and co-ordination.

The interviews took place in early 1994. Further details of the research 'process' can be found in the appendices. The results and an interpretation of their meaning are published in Kawalek 1994. This was a relatively new technology to have been integrated into everyday activity at that time, and the debate was later to be found to be complimented by Bannon *et al*/1988. The conclusions necessitated reflection on the product because it was fundamentally different from some of the older computing technologies.

COST/BENEFIT ANALYSIS

There was a particular emphasis in the interviews on appraising Notes in terms of cost/benefit analysis or general benefit to the business or individual.

The proof [of its value] is in the eating ... its well used here.

Indeed all three interviewees were enthusiastic. There was little doubt that it was a genuine enthusiasm. Indeed, it was seen as rather fun.

...I like playing around with it... and going into various stuff. I can find out what other people are doing... and it allows me to re-use material that somebody else originally developed.

However later reflection resulting from the cases that follow, suggests that there was good explanation of this (chapter 6, which details the socially laden 'orientations' towards intranet applications): the product was in effect being sold by MTS as well as used by them, which resulted in a certain vested interest in promoting the promises of the technology. Examples were shown on the way data was somehow intuitively moved around, and the contrast which starkly contrasted with expressions regarding the formal databases (DB2).

DB2 is so inflexible really. Now we really have a powerful information tool.

...it will never replace DB2, but I dare say it will do things that In the past have been done with DB2.

Obviously, the interviewees expressed some ambiguity and uncertainty regarding how they thought it contributed. To them, it was *obvious*, and there was little need to try and rationalise it into a framework or model. It was justified in terms of what it could do.

I am a member of Group, and therefore pick up data on [and] integrate my documents with their pictures...

However, the kind of appraisal of costs and benefits are bound to be difficult with such a product: it depends on the *everyday utilisation* of the product, rather than a rationalised 'model'

which makes assertions of 'rationalisation', 'cost cutting' or 'integration' of operations. The product had been driven into the organisation because the organisation saw the opportunity to sell consultancy based on it. Internal operations used it, based on a 'hunch' and a certain trust in the way it was to be used. For instance, *how* the product was utilised within the organisation determined the actual benefit and that could not be pre-determined necessarily, prior to implementation. It seems that evaluation of the product only comes with the assessment of the degree of sharing of information, and the degree of accessibility the information workers obtain, to different sources of information. Furthermore it seemed that users were in direct control over these two factors. Information Systems specialists or other managers attempting to pre-define work activities for others (users) could enable access to certain information and groups, but within that, it was in the hands of the users, what information was to be accessed; what groups and subjects were to be 'kicked off' and to a large extent which groups they read and contributed to. Thus only a relatively small proportion could be prescribed or pre-conceived by others (Information Systems specialists and/or managers). The conclusion here is that the effectiveness and competitive or organisational benefit is precisely in the *effectiveness of the users* and in their need and use and access for information. The evaluation of the product, or the value of information within this context is obviously a complex and difficult aspect to assess. Effective cost/benefit analysis in these circumstances requires very much a contingent and on-going analysis approach to its evaluation both prior to implementation. Because of the fact that users are constantly enhancing the data, evaluation should occur as an on going process after implementation, focused on the behaviours of those who directly apply it.

Thus to gain 'advantage' or added value, users within the organisation are required to contribute to, enhance and adapt information. They define their own requirements, who they work with and what information they should extract from available databases. Its effective use depends on the cognitions, learning, and the ability to evaluate and act upon information provided, and the ability to be discriminatory. This de-centralised, user orientated and informational set of concepts are very different from formally designed information or control applications (see also Mumford & Beekman, 1994).

USE OF TRADITIONAL DATABASE

Using Notes, users linked to traditional structured data in standard relational tables. This is defined as 'hard' data to distinguish it with Notes' own 'database' terminology, which is commonly textual or graphical with little or no inherent 'tabularised' structure. This type of user orientated data is defined here as 'soft' data.

Access to 'hard' data in Notes is controlled and defined by the traditional data access controls of the databases concerned. In the case of MTS, DB2 was used for internal operations, and was also used for client applications. The hard data sources were conceived by others (management and IS specialists), controlled in terms of basic structure and thus content by traditional database developers and administrators. Most soft data in Notes is not pre-defined in the same way, except where access to traditional DBMS structures are required. In other words the 'soft' data initiatives come from all sections of the MTS organisation who use the product. The 'hard', more structured and well defined data, usually held in centralised databases might be pre-defined and developed at least in part using traditional hard systems analysis methods, engineered originally from major innovations for change arguably conceived with the consent or approval from the higher levels of the MTS hierarchy. This would be quite natural considering the high levels of investment and potential change in working method that might be involved. Formalisation assists automation, integration and formal co-ordination of activities across organisational sub-function and is the traditional method of the application of the information technologies, and this is often seen to further some aspect of organisational effectiveness. This also is conceived, motivated or at least approved by senior management initiatives: the use of the data is done by means of a 'top down' initiated mechanism. It is very much an approach which would need to be harnessed by the top levels of the organisation, in order to re-structure the business. Hard data it seems, are better associated with the formal and standardised contexts, and indeed with traditional hierarchical management structures.

Yet the soft is very much the opposite, being user driven, un-structured, informational and 'enhanceable' by the information worker (often consumer). The implication of this is the danger of over simplifying or applying over or under formal technologies in an inappropriate organisational context or justifying IT expenditure without analysis of its application. Further, contexts and cultures depicted via hierarchical control mechanisms and structures as depicted in traditional texts both in Management (Anthony 1965) and

developed in traditional MIS and application development texts (see for instance Yourdon 1989 pp 33; Hicks 1993 pp. 4, Reynolds 1992 pp. 220, Curtis 1995 pp. 10). This is a sharply contrasting picture of the organic 'multi-skilled', 'empowered', information sharing 'team' depicted in more recent (see for instance Lambert & Peppard 1993) or post-modern texts (Clegg 1990). Defining sets of process descriptors, states and activities may result in work activities that are well defined, delineated and controlled, but ones over which the user has little intuitive control. In these circumstances over prescription may result in automation which control and do not enable and harness user abilities as depicted by Zuboff (1988). The interviewee perceptions of 'empowerment' and 'teamwork' were also investigated. The words in each instance were couched in cynical language. These again are direct quotes from the taped discussions.

I don't know whether I am empowered or not. Nobody cares, as long as I get the job done..;

I suppose I am empowered well that is to say its the only way to get things done. You've got to work as a team.

I suppose Notes really screws more work out of you....that's ultimately what they want isn't it? But it saves me loads of messing about.... I share my files and I don't worry about floppy disks and that.....

These quotations are striking in two ways. Firstly that the interviewees were educated middle managers with what seemed to be a fruitful career - but did not really identify with the words 'empowerment' or 'teamwork': that is what came naturally, not part of an organisational 'design'. Secondly, that these same people saw an 'us' and 'them' situation, suggesting that despite their position they felt a little on the 'outside', perhaps a little vulnerable and certainly not in complete control.

INTEGRATION OF DATA FROM THE FORMAL TO THE END-USER APPLICATIONS

Users at MTS access and interrogate orders, the accounts payable, the stock files etc., held on DB2, producing reports direct or enhancing the data by incorporating it into more traditional end-user tools such as spreadsheets for different purposes. Lotus Notes provides check boxes and menu items to generate SQL commands for accessing DB2 data. Thus users are put in control of bringing in hard data from other sources. The kind of hard data

accessed by users in essence is the by-product of the partial automation of order processing, invoicing and stock control over the last 20 years in MTS's mother corporation.

The fact that groupware products such as Lotus Notes assist the users to enhance data extracted from the more traditional database orientated systems highlighted further issues. The choice of data used in this way is potentially limited only by the extent of the data in the database, and of course as already mentioned, the security restrictions imposed on user access. Users of Notes at MTS focused on the informal, whereas traditional technology application often concentrates on the analysis, formalisation and automation of work activity. Taking experiences of the MTS staff it would be fair to assume that user oriented technology applications such as Notes can be used for *personal* goals and enable innovative use of data, which is highly dependent on the individuals involved. It also became obvious that traditional 'engineering' of data tends to be most useful on business activities which are well defined, clear and unchanging, but do not focus directly on this form of innovative use of data which potentially might harness the expertise of users which cannot be pre-specified. Thus user oriented applications such as Notes is more likely to be effective in ad-hoc, fuzzy, more complex situations or environments, the effective use of which depends on experts in fields other than the Information Systems specialism, applying the information and technology to his/her own working activities. In actual fact the connection to DB2 was available to the interviewees, but not used in general.

I remember being told how to do it, but I can't remember.... I don't really need to use that data;

I have a paper report that I use... I don't need all that stuff.

There seemed that there was an unwillingness to get involved in the formal applications, except where absolutely necessary. It was either still too complex, or it did not fit with *personal* goals.

GROUPWARE CO-OPERATION

Thus the interviews revealed that interrogation of hard structured data in this way has implications for the way formal designs and traditional Information Systems design and

strategy are viewed. Notes was somewhat popular in MTS precisely because of the accessibility to new forms of 'soft' data and this is the justified reason for its popularity.

I define subjects, define groups [to contribute to] and interrogate [soft] databases which I am interested in.

This obviously requires an understanding of what information is of importance. This question of the value or importance of information at any particular time for the organisation is very interpretive and soft in nature: the interpretation of meaning from data requires understanding of the requirements that it will serve (Checkland and Scholes 1990). The relationship to decisions being taken was pursued.

It helps me make a decision because I can choose the databases...

It helps me because I am better informed.

Yet there was little evidence that there was distinct benefit in a set of 'better' decision making. This was a theme that was repeated several times.

Researcher: Can you give me details of a particular instance when you made a different decision because of the use of Notes?

Each time this question was answered in terms of the possibilities, rather than the actual instances.

I can get into ... database and discuss...

... not specifically, but I use it to get more insight into the development of different projects...

The decision making was not separable from the everyday use of the product and was assumed; the interviewees never questioned or reflected upon this. The question did not make sense to the subjects particularly. It was obvious that the product did make a difference to action and decisions, but it was not easily separable in the minds of the users.

Considering the assertion that an information system is not a computer system but a computer system may be one component of an information system (Land 1992), the difference was not seen as obvious in the minds of the subjects.

We are a high tech organisation here... the best technology makes all the difference.

Information systems is what we do here ... [referring to the installation and consultancy in Notes]

The traditional view of information as being somewhat a by-product of automation fails somewhat to consider the informational role to which a computer system may be applied as a primary rather than secondary objective. In these cases it is the context in which the information is required, which necessitates understanding (Galliers 1993). It requires organisational and operational knowledge and inevitably by its contextual nature, defining information requirements is best achieved with high levels of direct user involvement. In practical terms whether this implies that an information Systems specialist works with users to understand their perceptions of information need and prescribes software functionality in order to meet that need, or whether the user directly gets involved in defining and processing data is of crucial importance. The 'value' of information *per se* was not considered by the interviewees. In fact it seemed a completely nebulous question to them.

Researcher: Have you considered that the technology may not give better information?

Some of the DB2 applications are inaccurate

I've never thought of it in that way.....

Of course. Its really important.... but I could not price every bit of information that I use...

In the operation of MTS's Notes technology, the role of Information Systems Specialist had become one of *technical* infrastructure support - rather than dealing with data and information, and the analysis of the decision making and human activity. Indeed the term 'Information Systems' takes on a new meaning where the Information Systems specialist focused on technology (rather than information) and network support, maintaining data integrity and the users are involved in the management of information. In the experience of the MTS interviewees, it was generally agreed that it resulted in part in the harnessing of

knowledge, expertise and experience in a quite informal and on-going manner, and having a very different perspective on co-ordination than the characterisation of application and design of information technology. However, none of the interviews quite satisfied the question of Notes's real impact, value or contribution nor did these interviews give insights into the everyday behaviours and motivations of the users.

CO-ORDINATION PERSPECTIVES

One further case note that emerged during these interviews was that the company had plans to use Notes to 'co-ordinate' activities together. It was to design into Notes a 'prompting' mechanism, whereby if a certain action was taken, then others would need to be actioned. Co-ordination Theory (Menzas 1991, 1993, Malone & Crowston (1990) and Crowson and Malone (1994)) does not differentiate between 'hard' and 'soft' co-ordination of human activities. It seems a logical progression from the previous discussions to differentiate between co-ordinative functions which are 'hard' and 'soft' in nature. The harder co-ordination is used here to specify a rigorous method to determine what processes are to be transacted at a particular moment in time, where states are monitored and when they change, it prompts other states to change, and also prompting human action. This concept is developed further in chapter 4. Thus a computer system can model and control which processes need acting upon, dependent on a set of pre-determined criteria. This is naturally closer to the formalised and well defined sets of interactive processes to which products such as ProcessWise and StaffWare have been applied. Data designs can prescribe action because there is often a strong link between human activity and data (see the discussion by Winter *et al* 1995). Soft co-ordination here describes where information consumers might determine what needs to be done and when, and by sharing information and messages, co-ordinate action in a more human-like intuitive manner. Soft co-ordinative concepts do not *prescribe* the workflow by being pre-designed (or hard-coded) by anybody other than the user. Notes itself is orientated towards softer co-ordination via shared information much like an extended form of e-mail. However it can use the harder workflow aspect of 'process' software architecture and workflow.

Thus hard co-ordination requires a series of stages and steps that are reasonably clearly defined, well structured and determinable (see also Wastell *et al* 1994). Soft co-ordination is more reliant on the intuitive nature of human intervention and this in turn depends on their

behaviour, knowledge and values. Accounts payable systems (Hammer 1990) thus have a set of clearly defined stages so that a particular order can be processed effectively. Linking 'processes' in this way would be defined here as 'hard' co-ordination. Human input may be required for exceptions to the sets of processes, and the movement of information on an 'ad-hoc' and intuitive basis is seen as 'soft' co-ordination.

Hard co-ordinative applications were being developed at MTS at the time of the interviews with the formalisation and co-ordination of activities as an objective but with recognition of the potential problems or liability of disabling intuitive decision making when exceptions were encountered. As already implied, traditional designs of technology tend to focus on the formalisation and automation of 'processes' using technology, without necessarily or explicitly differentiating between the automative and informative concepts. These transaction oriented and 'automating' sets of processes have data at their heart, but it is not the information which is the focus of attention. It is the automation and work flow. The applications being developed at MTS were relatively simple processes, which used the state transition concepts. Notes however was more naturally used as an unstructured information sharing tool with a much more intuitive method of co-ordinating the activities of different groups within MTS. Other products exist which are much more orientated to the harder co-ordinative function, and are thus closer to traditional data design concepts, and thus the focus on methods and techniques which ensure an understanding of the decision making which results from the application of such technology. It was surprising at first that the users seemed enthusiastic about these proposals.

...Notes can tell me that a project has moved to the next phase so to speak... Well it helps me not to forget doesn't it.

Yes it can help us get our act together. Its comforting I guess...

Sometimes you need to be told what to do And when

By March 1995, the plans to implement 'hard' co-ordination had been shelved. Obviously it did not fit with the goals or ambitions of those concerned, or the organisational context and methods of working practice.

DISCUSSION

The interviews were limited, for two reasons. Firstly they were designed to help develop some of the dimensions for analysis, and as such they were undertaken at the early stages of research. The interviews fulfilled these objectives but were limited in scope. In the main the interviewees were new to the product and themselves had little awareness of its contribution other than in a narrow type fashion, directly to themselves. Nor had they particularly considered the wider effects on work activities - more work, more responsibility, faster throughput and the like. Secondly, the interviews did not get to the individual motivations of the everyday use of Notes. Users could see how it was being used and how it was useful in everyday terms, but did not or could not articulate issues of value apart from assertions of how it can help share information. However, there were assertions and justifications which were rationalisable, but were not particularly deeply questioning or appraised in a wider organisational manner. There was little awareness of data or information overload, or the change in the nature of everyday work. Decision making was *assumed* to be 'better'. It was striking that the justification was done in terms of a certain 'realism' in the 'rationalisation' and yet the assertions about the value of the product for the wider organisation, rather than personal, seemed less than convincing.

Dividing the formal and informal components is not new, but the application of technology to that of the informal is the subject of (so far) rather limited debate within the discipline of Information Systems. Whilst the Notes interviews were limited in scope and in depth, they highlighted some contrasting issues. Many of the assertions require further investigation. For example;

- Do products like Notes provide information and/or data overload. Generally the term 'information overload' is often used without defining the difference between what is termed 'data overload'. There is of course significant difference. If it is genuine data overload, selectivity becomes an issue. If it is information overload, then there needs to be better understanding of context which would include the issue of gatekeeping and boundary spanning activities (Tushman & Scanlon 1981), which is a question of behaviour in context; or of labour processes; more information - more work, greater expectations on workers, the changing nature of work, professionalism etc. In either case, it is an issue for the discipline of Information Systems; human intervention needs good analysis of the problem and causes, and change needs to be reflective of the social values by which it is judged.

- The 'enabling' function of this technology seems to help people choose and share data rather intuitively. This was couched in language of 'empowerment'. However, this should not be mixed up with a descriptor for 'power' in a wider social sense (see Stanworth & Giddens 1974). Technology implementation is not some sort of altruism which shifts the balance of power in mutually beneficial ways for all concerned. Rather, it can be loaded, and whilst dressed up as 'empowering', it does not question the dominance of one group over another.
- This initial study does not answer how MTS really gains some sort of added value. The interviewees were enthusiastic. Enthusiasm is not a benchmark of added value on its own. It is probably fair to say that any such 'benchmark' could not be encapsulated by a simple 'model' to depict its contribution prior to implementation: it is more conducive to analysis which is on-going and behavioural: the value of the technology is in fact in its *everyday* use. Any judgement on what is useful is a human one which is based on ethical, social and behavioural values which cannot be imposed by a simplistic 'rational' model.

CASE 2: ANALYSING PATTERNS OF INFORMATION UTILILISATION AMONGST MARKETING MANAGERS IN SMALL TO MEDIUM SIZED ENTERPRISES

The second set of data presented is derived from a study of the information usage patterns of key marketing managers in South Yorkshire based firms. This is included in this work, as a result of serendipity, and a fortunate set of events which sometimes happens in research (a point made by Bryman 1992). This study demonstrates the extent to which informality and chance plays a key role in everyday activity. The study is paralleled with the above because at the heart of the question is 'pre-design'. In other words, the assertions derived from the MTS interviews suggest that in many circumstances building 'information' for others to use, is necessarily a formalising process may be inappropriate or oversimplified, as it depends on key aspects of context, environmental change the changing cognitions of the user of that information. Furthermore, as the following discussion demonstrates, the simplistic assertion that data designs can be applied to different user groups, can threaten the 'expertise' and associated assumed roles of those involved. The user or potential user of information is interacting in complex social and economic circumstances, and is fundamentally intransigent to change. Change will come therefore, from seeing a very distinct advantage to a discrete perceived goal, or from the questioning of the goals and how they might be achieved (learning). Information provision in these circumstances depend directly on such. The central question was how (if at all) a designed information service might aid the consumers of information.

RESEARCH DESIGN

Initial interviews were held with several local small and medium sized enterprises (SME's) in order to determine an appropriate outline and research approach for this section of the research. These served to identify some of the primary themes to be explored in the remainder of the study and to highlight the most suitable ways in which to capture the data required. Consequent upon this initial review, a questionnaire was formulated and sent out to personnel of over 500 local SMEs - this resulted in a response rate of approximately 17%. The questionnaires were targeted at pre-defined 'growth sector' companies - medical, materials, cultural studies, environmental and finance. From this group, semi-structured interviews were held with 27 respondents who had indicated an interest in discussing their 'firm specific' information needs and individual observations of the information provision

currently available, its usefulness to them and ways in which it could be improved. Interviews were also held with individuals involved in the provision of information - Information Officers, an Export Counsellor and a Network Broker - in order to provide a more comprehensive picture of the information potential available to local SMEs as well as an appreciation of the 'understanding' of those involved in providing a service to SMEs as to their information needs, attitudes and concerns.

The objectives of this section were to:

- gain an understanding of the current everyday patterns of information usage;
- to find out to what extent companies are aware and used 'designed' information services such as those provided by Business Link Sheffield, D.T.I. and others; and
- to establish where opportunity for 'better' utilisation of information existed (if anywhere), including technology application (internet and intranet applications and the World Wide Web).

The research was undertaken between July and October 1996. The subject necessitated an analysis of everyday patterns of information usage. However, these patterns are not easily gathered via questionnaire and interview. In this case, the instruments were the easiest to apply given other constraining factors; however more fundamentally, the key attributes of what was being sought was in fact quite well understood: the dimensions of the study could be 'bounded' to an extent. It demonstrates the need for having an open mind in research regarding the tools used. In this case, the instruments were deemed valid, and in fact via interviews, some further points were developed that were not originally expected. Whilst all of the above bulleted points were investigated in the research, the first is of primary focus to the current debate. The results have been published in Kawalek *et al*, 1997c.

USEFULNESS OF FORMAL INFORMATION PROVIDERS

The respondents were also asked to assess (via the questionnaire) to assess the usefulness of key information sources for developing export markets. Some of these were 'designed' formally by various organisations based on a set of assumptions about needs. Alternatively, they were not designed formally, and were the result of the individual 'information consumer's' informal information sources, own contacts or ad-hoc sources. Table 3.1 summarised the perceived usefulness of varied sources of information. The scores are derived from a weighting derived from questionnaire responses, and from each weighting (between 2 and -2), they were then averaged for each response.

Industry contacts	1.41
Agents/distributors	1.15
Sales Reps.	1.03
Trade fairs	0.65
Technical journals	0.37
Business Link	0.36
Chamber of Commerce	0.34
Legal advisors	0.32
Trade Associations	0.24
Dept. of Trade & Industry	0.24
Financial advisors	0.24
Business press	0.16
PreLink	0.09
EMIC	0.00
European Sources	-0.12
University	-0.33
Other Govt. Offices	-0.37
Buying Offices	-0.41
Internet	-0.48
TEC's	-0.48
Technopole	-1.06

TABLE 3.1 : PERCEIVED USEFULNESS OF INFORMATION SOURCES

These categories were pre-defined and mutually exclusive, and therefore a questionnaire was seen as an appropriate instrument. The categories had to be established using rather loosely structured interviews beforehand. There are obvious dangers in reading too much into this data, as the perceived usefulness is tied up with awareness of the service. However, this opened up one key avenue of subsequent investigation, which was the reasons for using the informal and ad-hoc 'contacts'. Thus the qualitative interviews were designed to check and verify these findings. The 'designed' information provisions of the Business Link, Chamber of Commerce, DTI and EMIC fared relatively poorly compared to the three highly informal and *ad-hoc* information sources - industry 'contacts', agents/distributors and sales reps. Yet, it can be seen that these marketing managers see their role as dealing with informal non 'designed' information. Comparable results were subsequently found in White (1986).

What was interesting also here was to explore the relationship between the information work and usage patterns and that of formal planning. During the course of dialogue during

interviews, it was clear the interviewees had market plans, which rationalised out the opportunities, the marketing and development of foreign markets. Unfortunately, only one such plan was seen by the interviewer, which was in fact a brief account of objectives based on financial criteria. This linked strongly with the budgeted income, and targets/objectives were set on such a basis. Very little was done in terms of opportunity analysis and/or product differentiation to reach new markets (it is hypothesised that this is quite common). In this case, planning itself was done on a rather *ad-hoc* basis. This became a very important point in the wider context of the current thesis. If the 'orientation' towards the *ad-hoc* was typical, then it follows that it is best seen as a pragmatic response to the immediate needs and goals, rather than a 'grand vision', and imposition of a 'grand vision' will ultimately fail, without the support of the subject. The issue of whether the subject is 'right' or 'wrong' is not an important question as information provided formally will not be used if it contradicts their perceptions of need. However, there is a need for critical reflection, to question traditional assumptions and this requires a level of learning. Intervention could not be justified by simply introducing new or 'formal' methods of work - a 'standardisation' of the marketing function. It was this subjectivity that became the focal point of the interviews, and it became apparent that where there was distrust of the formal information providers, it was based on the notion that they had tried to impose a 'best way of doing things'. This was expressed by many of the interviewees, most strongly epitomised by the following quotation.

...they tell us how to run our business. I only ask for help, not a sermon.

Thus the effectiveness of information must be evaluated by reflective learning on the part of the business manager (information consumer), which considers the wider issues - as in changes in working method, and assumptions. Training courses on 'how to do it right', with little reflection on the part of the subject, regarding limitations and assumptions, is bound to be of limited value. It suggests the need to develop the subjective consciousness, rather than the imposition onto it.

Exploring this informal and formal planning process a little further revealed some further points. Either informality remains the culture to the detriment of the more formal market planning process which would be linked to more formal (and designed) information. Or on the other hand, the informality of the utilisation of information is a culture built from the pragmatism of the everyday experiences and the ultimate need to 'survive' in difficult economic circumstances. However, the reflexive ability to attach value to information

determines the usefulness, within context, of information. It seemed to come from a subconscious sense of what is best, given a particular role or job function. In other words, there was a sort of '*sense of information need*', which can be usefully challenged. Yet this cannot be 'benchmarked' or a set of notions imposed derived from shallow notions of what is 'good' or 'better' information for a particular task. The 'sense of need' might be rooted in sociology or in psychology, but must come from a set of *personal* objectives which may consist of a set of pressures to meet personal, organisational or other objectives. In the case of the managers at the SME's, there were difficult economic circumstances which resulted in a certain urgency and pragmatism in their everyday affairs. This type of analysis is depicted in figure 3.2 which develops that of 1.3.

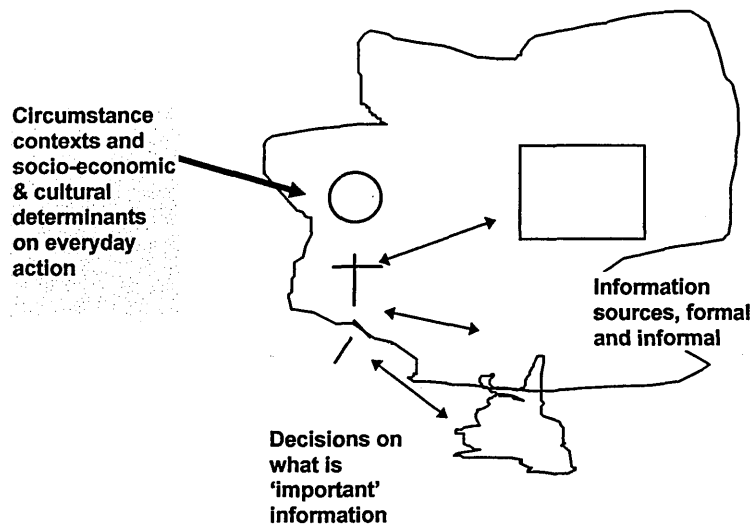


FIGURE 3.2: EVERYDAY ACTION AND INFORMATION: ORGANISATION POLITICS AND POWER WHICH IS ALSO LINKED TO WIDER SOCIETAL FACTORS

There are a number of issues that result from this type of analysis. The socio-cultural and economic factors which determine human action in any given social setting is akin to Agency which has been developed in other Information Systems literature (see Walsham 1993a) and sociological texts such as Giddens 1984. The informal information need and provision can become formalised over time. Modelling out the link between data/information provision and need can help conceptualise the link, but poorly used, might be seen as 'reality' and 'static' without being sensitive to the idea that it is only a representation of a simple human construction at any one moment in time, and does not question the 'rationality' and value laden assumptions inherent within it. This provided the impetus for developing greater sensitivity using social theory during the research process.

THE INTERVIEWS

The qualitative research concentrated on investigating these themes. In the approach taken has a highly pragmatic perspective in assuming that to understand better the key issues it is important to consider the question of how an individual within a given organisation sees him/herself and goes about his/her everyday activities. By starting on the everyday issues

and approaches, there are no assumptions being made on what *should* be done in a given situation/context, or indeed the determining aspects of a given social context. A total of 27 interviews were conducted over a five week period. The interviewees had self selected by ticking a box on their questionnaires and giving their name and contact number prior to returning it.

These interviews were taped to allow further analysis where appropriate, although it was not every interviewee who agreed to this. On a number of occasions “off the record” conversations took place subsequent to tape having been turned off at the ‘end’ of the interview. Notes were taken after each interview to capture the essence of emergent issues. The approach and structure of the interviews is outlined in Appendix 3. It was also recognised that there was a degree of what was understood as ‘*telling the researcher what they wished them to hear*’, which meant that questions about *how* SME respondents actually did things, were sometimes difficult to interweave into the conversation. Any exposure of poor internal information and methods of decision making for some was inappropriate to discuss. It was felt that given the terms of reference it was not suitable to probe in such areas especially on a single interview.

From the tapes or notes made at the time of the interview, detailed summaries were made of each interview. These formed the basis of an analysis which was used to group key themes arising from the interviews. These are summarised below. It must be noted that this ‘content analysis’ was deemed only a partial success, because there was deemed to be a need for some form of ‘analytic interpretation’ of key phrases and terms. This is developed later in the current chapter.

INFORMATION IS A DIFFICULT ‘INTANGIBLE’

A strong theme emerging from the interviews was the ‘intangible’ nature of information.

There is masses of information out there. But it is of no use to me... sifting through it is a waste of time. I need to be selling. Not pen-pushing.

While respondents would talk of tangibles - (eg skills shortages) - the notion of good information and a good information service was not an easy concept to which some could relate. Information was perceived to be fitting a set of assumed and unquestioned objectives.

The problem is one of getting the right information I suppose. I have experience of some of these people [referring to DTI sources], and they don't give me the information that I want. They talk of business plans, but do not get to the brass tacks of doing the job.

I want information on actual projects; I don't need planning or working with somebody. All I want is the right information.

This may have been influenced by their experiences of using information designs akin to a library service: a sort of one stop shop to pick up the necessary data, but one where little attention is paid to a sort of 'learning' which helps in some ways to evaluate the effectiveness of the information provided, as well as operating at the level of the information consumer, challenging his/her perceptions of need. One aspect that became very clear was the notion that the subjects tended to justify their own 'expertise' and inside knowledge, to justify their perceptions of information need. It was dangerous to question this in case of causing offence.

I know what I need. I need to know ... [details] ... I don't need a load of so called business advisers telling me how to run my business.

I have been in this business 22 years. I know it ... I'm better qualified than any MBA graduate....

In a way, the respondents had a view of this 'intangible' asset, called information, as a one way resource. It was to support their actions - to give new leads. There was a certain intransigence to 'dig' and 'question'.

... I want new leads, not somebody to tell me how to run my business....

... you will never be able to supply me with what I need. That is orders - or the route to them - ... good luck to you if you think you can ... I don't have time to mess about. I need to be out there, not in some library....

Implied in some of the responses, it was also perceived that to some 'information' was an inconvenience which stood in the way of 'running the business'. Discussions around this issue reveal a desire to have a far more prescriptive and formal information resource directed towards tangible business needs rather than a design with which they interacted.

I've got a business to run. I do not want to get involved in all this stuff. All I want is leads; I need to know how to get them ...

When issues were discussed of how interviewees internationalised business opportunities responses strongly reinforced the use of personal contacts (informal data sources) for doing business. This could be through a variety of sources, but would revolve around contacts often in industry who could be 'trusted', and contacts that could be relied upon for advice. Follow up questions indicated that this level of personal relationship was not something that they had experienced in the main, in using the services of current information providers.

I know lots of people in the business. I generally use my contacts. They give me inside knowledge of what's coming up.

The notion of exporting was for some highly problematic. Many felt that the risks associated would be more of a hindrance than the net gain they may get. Some therefore continued to use what 'worked best for them', without investigation of the availability export market information - relying on repeat orders. Perhaps allowing denial of the fact that there was a further opportunity to export. There was a distinct intransigence to use information which challenged the comforts of the familiar.

We have done two or three jobs for outside the UK [in the past 4 years]... yes if I had the time, I would be doing more to promote the overseas market.

No we do not do anything overseas. Our job is to export to outside Yorkshire!

Many of the interviews indicated that the business processes or "what the business is about" was not fully appreciated by a number of support agencies. There was a level of cynicism about such 'support agencies'. Two or three suggested that nothing would change due to Government attitudes towards the SME sector. This may have been out of turn, as one in particular made this comment after seeing what had gone in tax in his latest financial statement!

They have no idea. I need to do things and the bureaucrats tell me I've got to mess about with complete rubbish.

The government agencies just do not understand the small businesses. They see the importance of small businesses, but do nothing to help...

Implied was the feeling that the nature of being a small business, (some of which were family owned), gave both a particular cultural feature to the company and strongly influenced their attitudes to doing business. This suggested that many activities in SMEs are based on *ad-hoc* with little evaluation or planning. This is perhaps the most speculative issue and one that in the time scale of the interviews was not possible to develop further. For those who had persevered in using the designed information services, interviewees described a certain bewilderment at the variety of information and sources available without any obvious guideline as to how to get the most from them. This may also relate to a few individuals interviewed who commented upon the publicity and literature support for information services being collectively poor and confusing.

You need a degree just to look at some of the stuff that they produce.

My needs are simple. I don't not need anything complicated.

Continuing the theme of information providers the perceptions of DTI as a provider was very negative. Most believe that they were oriented towards large organisations, and too bureaucratic and *generic* in provision. The feeling of what could be called 'added value', must be something that is both perceived and felt by any individual using the information services. Such service providers must be challenged by the information consumer, and yet the information consumer must also be challenged. The two-way process is one dependent on on-going relationship building and mutual trust.

REFLECTIVE NOTE

In hindsight, these finding seemed almost obvious. The DTI and Business Link services perceived themselves as 'help' as in some sort of aid organisation: they were acting as donors, and they were servicing the 'recipients'. However this was done on the basis of 'expert' knowledge of what the recipients needed, but did little to conceptualise the subjective perceptions of need, or of the process of reflective learning. Further, there was little emphasis on learning by the providers either, as this might be seen as questioning the 'expertise' of the providers.

CASE 3: CENTRAL DATABASES TECHNOLOGY AND USER 'ATTITUDES'

The previous discussions developed the theme of the subjective nature of information, 'indexed' to the context which influences human cognition. It stands to reason that formalisation associated with pre-designed 'information' applications will be the subject of some criticism, characterised by calls for the inadequacy of the information providers and associated technology which delivers that information. The above discussion indicated a certain intransigence to question basic assumptions and change on the part of the provider and the recipient. In other situations, it was the reverse. The following case demonstrated the 'reaction' to formalisation, justified in terms of the need for adaptability and change. If the premise that information consumer perceptions are linked to a context which is perceived of as changeable, then it follows that 'formalisation' should be focused on those 'measures' depicted by the information that do not or are perceived as not changing over time (see also the discussion by Pfeffer 1981, pp. 16).

It is surprising that despite the myriad of tools and techniques for multi-user database engineering, relatively little has been made of the need for databases to be adaptable. This type of technology is notoriously difficult to adapt in an on-going fashion. Indeed some arguments for downsizing and distributing data using distributed database technologies is that it enables greater *local* autonomy over data and associated decision making (Hackathorn, 1993, pp. 105; see also Brueggen & Lee 1995; Baker 1994). The importance of this is that it suggests that such technology is bound to have an influence on change in an organisational context. Of course, it would be naive to argue that such technology should be adapted based on personal whims, but that even carefully considered changes are in fact often not incorporated, or are incorporated too late. Methods, tools and techniques for development and on-going maintenance of databases, whether centrally or locally resourced, tend to assume a rather static application context, because of the constraints of the technology itself and the bureaucratic and demarcated nature of the role of the Information Systems specialists within many organisations.

The methods and techniques used in hard systems analysis as depicted in (for example) Ashworth & Goodland 1990; Cutts 1987; Weaver 1993 are unchanging, regardless of whether the context is highly complex, turbulent and dynamic with multiple stakeholders, or a simple transaction oriented system. These dimensions stem from the following study in

database development and maintenance from the pharmaceutical industry in the UK. The perspective presented suggests that database technology, when used in all but the most unchanging 'environment', has been perceived to constrict 'bottom up' or user information innovation. By utilising the notion that perceived information need is indexed to the context in which it is based, then database technology, if used for informing purposes, must reflect that changing human cognitions and ability. Before analysing the pertinent elements of the study, a preliminary discussion of some of the key tenets of change and the implications for Information Systems is developed.

CHANGE, INFORMATION AND THE 'ENVIRONMENT'

It is commonly asserted that many organisations are going through, or have recently undergone change. Increasingly complex and competitive market places over the past two decades have demanded heightened flexibility and complexity of organisational information systems. The post-fordist mass production market place (see Wilson 1992, p 40) exemplifies how organisations are having to innovate in many areas of organisational activity; they need to change and adapt as an on-going process and utilise information as a central tool for organisational success. Even societal consumption patterns and expectations have changed resulting in change in working method. For example, the mass production of single products is now increasingly being overtaken by product differentiation: different styles, features, colours of products has resulted in the need for identification of clear roles for production teams as well as supportive administrative personnel, who are well trained and adaptable to modifications in the production cycle, and greater irregularity and less standardisation of orders. This has pertinence for not only shop-floor work activity, but in supporting information activity (see Mumford & Beekman 1994). The environments in which organisations operate are said to have become increasingly complex, increased through the diversity of environmental influences increasing the amount of information and skill required to handle them (see Johnson & Scholes 1989, pp 58). The assertion that there has been increases in the general business context has been quite popular in recent years with calls for greater flexibility and adaptability, but has not been accepted by some writers (see Gladstone & Murray 1998). However the theme of linkage between the ability for an organisation to change and adapt to environmental, economic and social turbulence has been the subject of some debate for some time (see Shani & Sena, 1993 pp 34). Further, this is said to be increasing pace, and having complex social and economic effects (see Porter 1990, 1994;

Mourdoukoutas 1996). The linkage between organisation environment and factors of organisation structure, culture, power and other key characteristics has been referred to as 'organisation fit': the ability for organisations to create structures and mechanisms to enable change in order to 'fit' a dynamic environment. This same construct has been used in the Information Systems literature. Marcus and Robey 1983 pioneered a recognition that there was a need to see information systems infrastructure as *organisationally*, as well as technically valid. There are of course some very substantial issues facing theorists of organisation change, and indeed the concept of 'fit' has its own difficulties (Wilson 1992, Plant 1987). As a conceptual device, 'fit' cannot be questioned as a useful notion: the problem is one of pragmatic implementation of such a concept. Despite its obvious problems of what should 'fit', and what should be measured to test the level of 'fit', the concept is widely used as the theoretical underpinning for much of the theory or impetus for organisation change and strategic alignment. Applying the idea of 'fit' results in 'models' of (often termed 'strategic') fit, these apply differing ideas of what key categories should make a 'fit' and how they should be measured.

Despite being aware of some of the difficulties, this section takes the notion of 'fit' and uses it simplistically as a conceptual device to argue that change is on-going, and as such, it would be expected that data structures inherent in database applications also needs to have a certain level of dynamism to reflect the changes. Information consumers are seen as agents of information systems change.

The following organisation is used in because there was a distinct Information Systems department which serviced a set of prescribed information needs of those outside the department. Of course this is common of most medium to large organisations. However, as is demonstrated, change in the core data comes from power and 'political' pressure on the Information Systems section to change data structures, rather than from some 'rational' or 'strategic fit' criteria; also that the Information Systems section put up structural or bureaucratic barriers to reduce the chances of modification requests; these may exist for technical (because the technology is awkward to change) and good administrative (it would take too long) reasons, but generally do not consider wider organisational criteria's. However, there was a '*sense of*' importance attached to certain changes. This seemed to be derived from a sort of contextual awareness which encompassed power, but also a sort of *vague* notion of what was a worthy change. However, this '*sense of*' notion was apparent in both the

Information Systems specialist interviewee and in all the 'consumer' interviewees but tended to get swamped by the everyday complexity.

However, before looking at the key points in the case, there are a few additional points that should be raised. It is important to question some of the precepts which dominate in certain circles in systems analysis and design. Thus, if a designed application has more stakeholders, then it follows that, if there are high levels of consensus in the objectives and function of the application, then a specification of requirements is more easily achievable than would otherwise be the case. Further, it would also be logical to expect that a highly changeable 'environment' would be more likely to necessitate changes to the fundamental databases within the organisation. Not just the data within them, but the structure - new fields would need to be added, lengthened, types changed, program code adapted and developed, new reports and queries applied. The application must 'fit' the cognition of its consumers, and organisationally 'fit' or be 'aligned' to its fundamental goals and power structures. This is articulated in Marcus & Robey (1983). Obviously involving users in specification of requirements has not been ignored in traditional systems analysis methods (Ashworth & Goodland 1990; Cutts 1987; Weaver 1993). However the orientation of these texts is for a 'one-off' specification, and currently most training courses in systems analysis would follow this principle. Maintenance tends to be given scant attention. The hypothesis is then that this is fundamentally flawed: it is rather convenient to specify and build a database - as if a discrete project, with the product having a completion date, and signed off. Furthermore, these same texts emphasise that an organisation has a single database data structure which is 'discovered' by the systems analyst. See Eva 1991 pp 116; Ashworth & Goodland 1990 pp 10; Cutts 1987 pp 23; Weaver 1993 pp 134. Multiple perspectives at requirement analysis time is translated somehow miraculously into a single data structure (Lewis 1994). The database data structure is seen as highly static and not changeable or adaptable because it is 'right', having been 'discovered'. It is suggested from the points raised in the following case, that this assumption is based on the current limitations of the software components rather than being embedded in *organisational* and everyday reality. For further related discussions in a similar vein, see Lewis 1994, ch 8, De Carteret & Vidgen 1995, ch 15. Thus the case demonstrates some of key dynamics and tensions which result from this type of analysis. There are a number of key points that are raised by this work:

- the organisational dynamics juxtaposed with the 'static' nature of some of the implemented databases;
- the information consumers (or 'stakeholders') were pushed out of the process of adapting the databases. Procedural and organisational barriers were present, which acted to stop requests for change in the databases;
- resources were overly limited for any changes to take place. Cost of maintenance was underestimated;
- tensions are highlighted between information consumers and those responsible for maintaining the database;
- the technology itself proved awkward and difficult to change;
- similar problems existed in decentralised database applications as they did in centralised applications;
- when changes were made, they were not based on reference to a 'rational'/'strategic fit' model, but were the result of high levels of pressure by information consumers. The priorities in amendment came from a '*sense of importance*' intertwined with a set of technical and organisational constraining factors;
- changes that were not made were justified on technical complexity and the need to maintain security and integrity. Often these seemed quite justifiable. However, interestingly perhaps, there was no examples of organisationally based criterias mentioned;
- the conclusion was to see this form of analysis in behavioural terms rather than in approaches that assume a certain 'fit', or models of what *should be* as opposed to *what is*. Thus analysis seemed to suggest the need for analysis of everyday issues and affairs, and the human construction of these.

DATABASES, 'FIT' AND PHARMA-CHEMI

The case that follows is based around experiences at Pharma-Chem Pharmaceuticals UK - one of the subsidiary companies of Pharma-Chem PLCⁱ. Contact was been made with an employee of Pharma-Chem. This was a middle ranking manager whose responsibilities were associated with the Information Systems function. Informal discourse with this individual went on over a nine month period, sparked because of his vague uneasiness about the technology implementation. The informal discourse consisted of numerous meetings and phone calls. This informality helped the focus and clarity of the current work because, whilst there were obvious issues and problems, the reasons at the time were far from clear. Issues of accountability to the information consumers was of obvious concern, but the heuristic of 'fit' which came to underpin this type of analysis was not. The focus was initially on the technological infrastructure, rather than at the organisation level. During April 1995, a number of key 'stakeholders' were interviewed. The interviews had the broad remit to discuss perceived problems and issues, though its form was very loose. This work relied on the emergence of personal issues and concerns which were subsequently synthesised and analysed. The outline of the interview format is detailed in appendix 3. In total five people were interviewed - all of whom were stakeholders and users of some aspect of the database applications which had been developed at Pharma-Chem. One of these people, and the original contact worked in the Information Systems department. Having undertaken the interviews, contact was fortunately maintained; fortunately, because the interviews were rather ill-focused. In hindsight, it could be seen as a flaw in qualitative method, but it did enable and add to key construction of ideas which focused better on information and behaviour, rather than technology. All interviews were taped, and this helped after-the-event reflection.

Pharma-Chem Pharmaceuticals UK made extensive use of traditional centralised and multi-user database systems, and were moving towards decentralised database applications. This makes the case particularly interesting in the light of organisation change, and claims that downsizing lead to greater accountability towards the information consumer. At the time of writing, Pharma-Chem had experienced increased 'environmental' pressures, initiated from one of its key customers - the government. These pressures included new price regulations, the introduction of a 'limited list' which dictated product/supplier purchasing arrangements and the increased buying of cheap low margin generic pharmaceuticals by the NHS. New Trust hospitals had become much more keenly aware of expenditure, and this had direct impact on Pharm-Chem. In reaction to these new pressures, an announcement early in 1994

stated that the Strategic Business Units (SBU's) Pharma-Chem Pharmaceuticals and Pharma-Chem Manufacturing Services would be working more closely together although they would not be merging. Several joint company projects and working parties to investigate ways to integrate areas of work of the two companies were soon established. Pharma-Chem Pharmaceuticals UK were seen to be reacting to increased external pressures by aiming at rationalisation of its operations. These reasons were given as the justification for change, though the focus of concern was not to question this aspect. The organisation purposefully aimed at making a significant change to its structure which had implications for power and information within the organisation. Indeed, the case was interesting because of the dynamic, on-going and intertwined nature of upper management's vision of change and the provision being made to enable the change. However it was also interesting because of the changing perspectives of all individuals involved in the organisation. These perspectives had implications for perceived needs of information.

Pharma-chem had experienced the same types of pressures as that of many large organisations in that its computing applications were largely made up of transactional processing applications and all the required processing power for the organisation could be delivered by a large mainframe computers. Until the mid 1980's, PC's and user-oriented software products were not generally available, and all 'computer' work was controlled by the organisation's data processing (DP) department which changed its name in 1992 to Information Systems Development (ISD). However using the organisation fit construct and analysing centralised database functions in the context of fast-changing working environments, central database functions tended to be slow to react to changing *information* needs as perceived by the interviewees. This included those working in the ISD section, though there were some subtle and less subtle differences in language used. This had important implications for the way work was achieved, and thus centred around a vision of sets of work and information processes which were specified at system implementation time. Change or adaptability had never been a major consideration of the application designer at development or implementation time. The central databases at Pharma-chem was typical in the sense that when changes to the data tables needed to be made, the whole computer 'systems' had to be taken down in order to make the necessary changes. For example, a recounted experience was the need to make the centralised stock system compatible with a newly implemented Engineering Plant Management Application (EPMA). To do this, its stock code field needed lengthening. The EPMA systems development team had to identify the quietest time of use on the stock system and then take the system down for three hours

while the necessary changes were made to the tables in the database. Reports and views and forms had to be also changed. This simple change exemplifies the difficulty, and more dramatic changes obviously can be more complex. This change had occurred, though there were frequent requests for further changes, many of which had a lower priority. Requests for changes to field types or lengths, or indeed additional data fields on new or existing reports regularly meant that table structure needed amendment. These types of request often needed complex data analysis in order to ensure maintenance of data integrity and additionally changes to existing reports, views and forms.

The interviewee information consumer/workers were asked to recount actual examples of requested changes and outcomes. Most of those recounted were in fact additional reports; it seemed that the interviewees were quite aware of the data that was stored, and therefore recognised the limits of the applications for their area of work. For example, a request to include a new report, which summarised weekly totals of production targets into quarterly totals. Prior to the report being completed, the data was punched into a spreadsheet from the weekly totals data as a stop-gap. This additional piece of code was recounted as taking four months. There were two examples which necessitated more fundamental change to the data structure, both of which were rejected, and both seemingly perfectly legitimate and (potentially) important requests. Firstly, there was a request to alter the jobbing categories in the new production scheduling EPMA system. The information worker wanted a further breakdown than that provided in her analysis of actual and budgeted costs, which included labour costs on particular production activities. This request was rejected by ISD. Secondly, another request wanted a cross-tabulated report between internal product codes and a number of key customer product codes. This was also rejected by ISD. Six months after the interviews were undertaken, approximately two years after the original request, ISD did include such data on reports, as a result of a customer request. The initiative and innovation never came from organisation or strategic 'fit', but from power and pressure.

Most organisation's have procedures which have to be followed when changes are to be made to applications where 'live' data is involved. Pharma-Chem for example, operated what was known as a 'Service Request Procedure'. The person requesting a change had to write the request on a pre-printed form, gain his manager's signature, the system owner's signature (which was either ISD or a user department head), then send the request to the Information Systems Development (ISD). An ISD member then has to sign the form as the 'ISD owner', make the relevant changes to the data or report, get his manager's signature, and send the

request back to the user. The user and his manager then signed the form again accepting the changes that had been made. The service request is then sent back to ISD and the request is closed and the form archived.

ISD staff once held a competition to find the service request with the most mileage!

According to the interviewees, there were many examples (not recounted during interview) where there were changes requested to reports, or data additions but there was a feeling that there was little chance of certain suggestions occurring either at all, or within a timespan which was useful.

It takes a bloody age

I have had a request in for six months. It had approval three months ago ... and its is still waiting to be done. I don't need it any more

Researcher: *Have you told them that you do not need it anymore?*

No. Not yet. I will ... [laugh] ... soon.

They are all a bunch of prize prats...

This problem is partly a formal policy restraint. Pharma-Chem policy states that electronic signatures are not acceptable so the service request procedure could not be speeded up by using technology. However there was a technical restraint in that databases generally did not lend themselves to even the simplest change in reports, data structure, or views that involves change to the fundamental data structure. However, more fundamentally there was a culture of discouraging such requests. As one ISD team leader put it:

.... We get requests from users all the time. The trouble is that we do not have the resources to make the changes. If we did that, we would need three or four times the number of staff... mostly the requests are for things that they can't be bothered to do for themselves...

The development of a new application known as the Engineering Plant Management Application (EPMA) illustrates the political and power dimension to the development and maintenance process. For example, during the initial equipment information data-load onto the new application, a group of equipment identifier numbers were entered wrongly. A service request for changes was initiated, requesting the project team to make the required changes to the necessary data. An outline SQL script was even provided by the requester, in order to save time and work. After 'some investigation' into this problem, the project team decided that to alter the tables using an SQL script would be just as time consuming as making the changes manually. The service request was subsequently rejected on the grounds that the database structure was "...*too complex to make the required changes*". However there were further 'political' dimensions to this decision regarding project deadlines and team priorities. On the EPMA project, the development team worked to their own project plans and also an overall project plan. If for any reason, a project milestone was not accomplished on time, the fault would inevitably be placed on either the project user team or the project ISD team. In this instance the ISD team decided to reject the service request rather than spend more time investigating the problem or writing/adapting the SQL script to solve the problem as this may have resulted in EMPA project being completed late. The task completion of a particular project team in this case took priority over maintenance. For seven months, the application was generating reports with wrongly coded equipment identifiers. Meanwhile, the data was re-keyed into a personal computer database with the correct codes inserted and reports were cross checked against it. The information worker who maintained the PC database subsequently left the organisation and, having become an issue of power and politics, because of a lack of trained staff to use the PC database, the EPMA system was then amended.

Obviously there were tensions between the ISD division and other 'stakeholders'. From the ISD perspective, a problem sometimes could have been quickly solved but it was a generally accepted un-said policy not to deal with problems too quickly. The thinking behind this was that there would be subsequent requests which would be expected to be resolved equally as fast. The following quotation is a flippant remark from a member of the ISD team:

...if you solve the problem quickly this time, they will expect it doing this fast every time.

Certainly in the ISD section there was a feeling that expectations rise as the service improves. Thus there is an undercurrent power dimension as well as there being technical constraints

which together provide for a situation where individuals find themselves working in ways or under constraints that they might otherwise find themselves. User applications were seen as a way round these problems.

DECENTRALISING DATA RESOURCES

There are probably good reasons for decentralising IS resources. Many large companies are moving into new markets and geographic locations and thus, it has become increasingly difficult and costly to access data in a traditional centralised database environment (Brueggen & Lee, 1995, pp 15). Mergers resulting from the requirements for economies-of-scale advantage and the multi-nationalisation of groups result in structures that are becoming increasingly distributed. This fits also with the trend to place specific functions and elements of the organisation closer to the customer and to make the organisation more flexible and responsive to dynamic change in the environment. Crowston and Malone (1994) suggest that the decentralisation of organisations increases autonomy and that such approaches to I.T. encourages greater decision making participation by workers at 'lower levels' of the organisation. These are seen as justifications, and on the surface highly organisationally oriented rationalisations. Cynics might equally validly point out that low cost servers were the primary motivator; the motivations were based on hardware costs, rather than the justification of making data resources 'more accountable'. Whilst the assertions here are not disputed with regard to the IS function in principle, the focus on the degree to which distributed databases specifically enable better focus on the individual needs assumes that it is the technology which is the main driver. In such analyses, the organisational and power conflicts, the pressure on resources to carry out changes are missing. It is an idealised view.

Like in many organisations, downsizing and distribution of data was, at the time, of key concern. At Pharma-Chem, there are political and technical issues in the process of distributing data resources. Each new server purchased to run a 'user system', was taken from the central ISD budget although the user department became the what was called the 'system owner'. This led to further power games at the time as the 'IS support' function gained credibility, which was seen as a potential threat to the central ISD. These central servers hold very little in the way of traditional DBMS table data, although distributing the database functions was seen as a long term objective by adding database servers onto existing networks. The 'rational' reasoning behind this is often put in persuasive terms (see for example Hackathorn 1993, Grosvenor 1994) and is articulated in most DDBMS texts.

However, if we explore the reasons for devolution of databases in the context of organisation fit, then there remains some dubious assertions or at least unexplored areas when articulating the degree adaptability. Updating data structures and matching them to perceived need can remain a complex procedure, requiring high levels of specialism amongst development staff. Drawing off reports or queries from decentralised databases is no more or less difficult than in centralised systems. Access to SQL will need to remain somewhat restricted whether using a mainframe database product or on a server in a client-server architecture. Complex joins and the associated arduous logic that it follows will always remain too dangerous for exposure to ad-hoc queries by untrained staff. Of course, access to a DDBMS DDL as it is on a centralised DBMS, and links to joins, must be prohibited. Strict controls in order to restrict access to sensitive data is an obvious necessity on both central and decentralised databases. Indeed focusing on data to support groupings of work tasks and functions can be provided by central support as it can be decentralised systems. Thus the assertion that decentralised databases are more accountable must be seen as a little dubious, because of the many political and other constraints of any one context. Yet all of these make the data product less accountable to the information needs of its key consumers and necessitates the inclusion of further organisational bureaucracy.

REFLECTIONS

1. ON THE CASE STUDY

The above discussion has highlighted a number of key issues premised on the idea that a linkage should be made between database technologies and the transience of data to support particular activities. Traditional databases might be best applied in only the most unchanging contexts. There are a number of factors that suggest that non Information Systems specialists are demanding increased influence in database table structure, as well as the reports and queries associated with it. Firstly such like individuals are becoming more IT literate and are now demanding more from the available IT resources (see Culnan 1983). The technology is increasingly being seen as a *tool* rather than a black box that nobody other than Information Systems specialists have control of. Secondly, studying and trying to understand the issues at Pharma-Chem suggest that the information systems are increasingly being used for an increasing variety of work tasks, which see information as a key resource. Technology is more than holding a set of transactions where information is a by-product. Information is

the goal. And this necessitates understanding its *everyday* usage. Difficulties arise from the complexity and subjective nature of information and human-meaning-attachment (Galliers 1993, Checkland 1992), as well as the organisational changes which affects human meaning attachment. Increased use of object oriented development methods and rapid application development software reflect the need to develop systems quickly, prototype, adapt and change applications on a regular basis. This general movement is a result of the necessity to gain flexibility over data tables and structure - an area which as shown in the Pharma-Chem study, is rather sensitive. There is not just a technical dimension to this, but there is some political sensitivity associated with it, as power and control is invested into the data structures. The political dimensions to database development and the need for adaptability both as a managerial consideration and at a technical level are key considerations.

The demand for heightened understanding of activities to cope with demand fluctuations and more generally environmental complexity are central to the successful operationalisation of this idea. Furthermore it demands teams, often decentralised, which are highly co-ordinated and in many situations are highly skilled to adapt to new or varied situations (eg product lines). Complementing such themes is the debate regarding organisation structure. The characterisation of organisation structure, increasingly seen as a set of flexible and manageable processes to co-ordinate activities, contrasts with an organisation structure (seen as an hierarchy of control with well defined and rather rigid roles). Multi-skilled workforces are seen as increasingly required to enable *flexibility*, and this trend is a movement away from the traditional hierarchical and rather monolithic view of organisation structure as depicted in influential work such as Anthony 1965. Such themes are developed for example in the Business Process Re-engineering literature. See for example Hammer (1990), Davenport and Short (1990), Harrington, HJ, (1991), Davenport (1993). Smaller, discrete and more 'manageable' teams controlling functional units are, it is said, replacing the militaristic and hierarchical organisations of the past; each process unit being being highly co-ordinated and the quality of output more closely monitored. Skill, individual responsibility, and professionalism in the job tasks being undertaken within the functional processes is replacing the highly demarcated and well defined task definitions traditionally associated with the fordist or bureaucratic organisation of the 1970's. Thus technology plays its part in this by enabling such radically changed working methods and co-ordinate functions and processes to support a highly flexible organisation structure. For a complementary discussion, see Scarbrough & Corbett 1992, pp 32-48.

There are a number of points on the above discussion. Firstly that these can be used as a justification for changing organisational work method; downsizing, outsourcing; flexible working, multi-skilling - are all terms used regularly in the managerial literature in the 1990's. Whilst all potentially 'legitimate', and undertaken with good intent, such change programmes are in fact not undertaken as the result of consensus, accommodation or altruism. They are taken because of 'reactions' to the need to compete in changing markets and 'strategic alignment' models are used to justify changes. These justifications make socially loaded assumptions around profit maximisation. It is socially loaded because organisations have many stakeholders. As Stacey (1993) points out: *Organisations exist because people within them and outside them are willing to support them in financial, political and legal terms. Successful organisations are those that do reasonably enough what those inside and outside principally expect from those organisations or will accept from them. Success can be then judged only in terms of the nature of the primary task that the community sets for an organisation. Failure of that task leads to the withdrawal of support.*

Secondly, it would be wrong to assume that greater orientation to the information consumer is necessarily 'correct' in an absolute sense. Humans are complex beings, and changing databases a complex task, and every whim obviously cannot and should not be accommodated. However what is 'right' and what is 'wrong' must be subjected to analysis. There must be an element of reflection in the process, and these types of analysis can only be understood in everyday behavioural terms.

Thirdly, it was striking that there was some basic assumptions about the association between modernisation and organisation development, associated with information systems. The two are not the same thing. Whilst development is modernisation, not all modernisation is development. Mechanistic modernisation using information technology tends to be perceived of as the domain of the ISD, and keeping the locus of decision making within ISD. It seemed that the outside groups were objects of the transformation process inherent in information systems change, rather than the subjects of their own transformative process, and this could explain the frustrations that were expressed.

II. ON CONTENT ANALYSIS

As mentioned, the content analysis was deemed only a partial success on the interviews that took place. Content Analysis takes qualitative data and, based on pre-defined 'categories', the

occurrences are calibrated and calculated. On reflection there are a number of problems with this.

1. At one stage or another the 'categories' are created based to some extent on the assumptions of the researcher. The separation of researcher and subject cannot be achieved in practice, and can be used with similar assumptions as the *tabula rasa* in Grounded Theory. The separation of researcher and subject assumes an element of 'objectivity'. Thus at an epistemological level, the researcher using a technique such as Content Analysis needs to use it with care. In particular using such an approach at such an early stage of research was not easily workable, as the focus and categories had not been sufficiently developed. Without reflection, a technique like content analysis might be seen as 'objective' and lacking in analysis of interpretation of the phenomenological world of the observer or observed. To argue that the categories are 'objective' denies the role of the observer in the category creation.

2. The interaction between interviewer and interviewee results in the data upon which the analysis of content is placed. However, the interaction is precisely that: the researcher guides and influences that interaction, leading the interviewer to say certain things. This is both strength and weakness, but muddies the idea that such an approach is in some way 'objective'.

3. When applying such 'categories', it can easily oversimplify the *meaning* attached to certain key issues/factors or ideas of the interviewee.

4. The meeting of theory and practice is of key importance. Interviewees can tend to say things but in fact be acting in a very different way, or expressing 'facts' without acknowledging some underlying issues. For example, issues of power, are generally not well articulated, but once prompted by interviewer, are generally acknowledged to be of key importance.

Whichever technique is used, to claim 'objectivity' which is devoid of researcher influence over the subject cannot be attained. Purity of qualitative data comes from reflection and argument building where theory plays a pivotal role, but objectivity can never be attained. Ideas and meaning make good research, not empiricism and empirical verification; that is not to say that empirical studies are of little value. Rather it is to say that it can be at times so

concerned to attain validity - striving perhaps for 'objectivity', that it loses sight of meaning. Indeed in its worst case, empirical validity sounds like a 'social defence'.

III. IN SUMMARY

There were many issues that emerged from the three pieces of empirical work. However, each investigation showed a certain naivety on the part of the researcher, but yet gave a certain insight into some of the issues, or 'lines upon which to look'. Firstly that information technology is not necessarily the result of a purely 'rational' process. Traditional database technologies are formalising in that they are 'pre-designed' for assumed sets of need, based on human constructions, and yet this results in certain behavioural patterns: these are reactions to the formalisation. Secondly, and most importantly, the perceptions of need is linked to the context of the information worker, and thus what is meaningful and important is dependent on a number of subjective criteria's. These are neither 'right' not 'wrong', but can be usefully challenged, which is perhaps an issue which links reflexive learning with information management. Thirdly that 'idealised' models which attempt to depict what *should* happen, is not necessarily the same as what *does* happen. Model building is very much embedded within the IS literature, but deeper analyses might be developed from the analysis of everyday behaviours, which incorporates aspects of power.

Further, if we accept that there is a link between designed information, and organisation structures (see Harrington, J., 1991), then information cannot be separated from the analysis of organisational form. If this is the case, what does it say of the informal - which can in some way edify the formal, or enable analysis of the key tensions in adaptive processes, or be powerful determinants of the 'sense of information need'.

Yet any such analysis needs to consider the power dimensions, not only organisationally based, but based on the wider socio-economic factors. For instance, the marketing managers in SME's were reacting to economic 'realities': rationality in the planning process was in effect determined in part by such socio-economic circumstances. Global economics and markets were playing their part (Mourdoukoutas (1996)). Not that the plans played no part in *guiding* action; but attaching 'rationality' which assumes order, and making no link to key determining factors in organisation, societal power is perhaps to dangerously oversimplify.

The early empirical work provided insight into both the limited cognitions of the information worker/consumer, and also some dominant assumptions of the Information Systems specialist. These themes are expanded in a number of ways in the following chapter.

ⁱTo protect confidences, in each case a *nom de plume* has been used.

CHAPTER 4

DOMINANT ASSUMPTIONS IN THE DISCIPLINE OF INFORMATION SYSTEMS

Experts can solve differences of opinion, or so the presumption goes, by means of their methodology and their scientific and technical norms. If only one conducts research long enough, then the opposing arguments will fall silent and unity and clarity will prevail. The exact opposite could occur. Research that inquires further into more difficult questions, taking up all the objections and making them its own, this kind of reflexive research breaks up its own claims to clarity and monopoly; it simultaneously elevates both the dependence on justification and the uncertainty of all arguments.

Ulrich Beck, 1994, p. 49

INTRODUCTION

The above discussion initiated a number of key themes which were deemed as central to an analysis of end-user information and technology application. It highlighted the need for investigating the behaviours of the subjects and the 'constraints' on their cognitions. It also highlighted the issues of critical learning and reasoning processes of both the Information Systems specialist in supporting users (seen as part of the function of education and learning in the discipline of Information Systems), and in the critical reasoning of the users themselves. It also highlighted the role of organisation structure, and the 'defences' that occur in everyday context, particularly with regard to the 'bureaucratic' defences and the role of 'expertise' in explaining such behaviour (see Attewell & Rule 1984). The current chapter takes some of these notions further, and investigates the dominant assumptions of the Information Systems specialist, who reflects the dominant assumptions of a discipline which has undergone significant change in a relatively short period. This chapter develops these themes by theoretically deconstructing some of the fundamental assumptions in structured analysis organisation change and re-organisation, as depicted in the Information Systems

literature, and argues that some of the simplistic assumptions within the discipline of Information Systems are detrimental to understanding the behavioural traits, and therefore of resolving ensuing problems (Boland & Hirschheim 1987).

Information Systems in practice and within the literature, emphasises the application of many and varied tools, techniques and frameworks. For instance, table structures, depicted in entity relationship models, have been the subject of theoretical deconstruction in (for example) Lewis 1994 chapter 8; De Carteret & Vidgen 1995, chapter 15; Klein & Hirschheim 1987; Lyytinen 1991). This chapter aims at a philosophical deconstruction of what is often seen as a complimentary technique in structured methods for designing systems, and juxtaposes this against the debate introduced in the early empirical work. That is of the analysis and specification of organisational data and information flows. Further, the chapter aims at making the link between such techniques and some of the more strategic thinking that is commonly made, which commonly utilise such techniques or extensions of them. Thus for example, analysing information flow in terms of deconstructing 'processes' and linkage between 'processes' and specifying alternatives, has been linked to Business Process Re-engineering (BPR). This chapter argues that the over simplistic utilisation of such a linkage is potentially dangerous and, rather than being used as a helpful heuristic, tends to be used in a rather deterministic manner, devoid of analysis of *everyday* action or behaviours, and causes certain behaviours which are not seen as conducive to developing a constructive culture which is a prerequisite for innovating practices.

Indeed such approaches tend to focus on tasks, rather than on human development and learning.

Certain techniques then, originating in modelling technology, become dangerously embedded into designing organisations. To deconstruct and argue in this way, the chapter is divided into three sections. The first introduces the paradigm model of Burrell & Morgan 1979 and the philosophical notions developed in chapter 2, which are used to elicit some of the value laden and philosophical assumptions of re-designing work using (what are termed here as) Information and Workflow Analysis (IWA) techniques. Thus the second section focuses on assumptions made in structured systems analysis; this is seen as a 'lower level' analysis of workflow. In the third, the focus turns to a more strategic view, encapsulating the Business Process Re-engineering literature, which has been used in certain circles as an extension (or 'strategic') view of the more traditional view of workflow analysis. The chapter builds on the

argument so far developed regarding the changeability, the *ad-hoc* nature of information utilisation and the way information is *created* by the world view of the information worker. Both sections do this by theoretical deconstruction, and assertions are developed further from this in the later chapters in the thesis.

PROCESS, ORGANISATION DESIGN AND THE SOCIOLOGY OF ORGANISATION

Equating the concepts of design, workflow and BPR with conceptual sociological and organisation models or set (or paradigms) is an attempt at better understanding rather than providing 'solutions'. The development and emergence in the disciplines within Management and Organisational Behaviour which advocate an epistemology derived from the phenomenological constructions of the subjects of study exposes some of the assumptions of the 'objective' approaches in some of the areas of Information Systems. This has acted to polarise debate in management research, and in the discipline of Information Systems, and has largely centred around the Burrell & Morgan (1979) paradigm model.

Business Process Re-engineering (BPR) is probably a good example of this debate: the natural sciences, dominating research into the technological aspects of computer systems, utilise sets of methods which largely can be described as 'objective' in nature, not considering the phenomenological constructions of the subjects or the need for learning. However, orientated as it is towards organisation processes, BPR and techniques sometimes associated with it, which require organisation change are limited without exposure to the phenomenological or hermeneutic traditions (Heidegger, 1962; Gadamer, 1975). The Burrell & Morgan (1979) model bundles ontological and epistemology assumptions together (as described in chapter 2) but introduces two further categories; regulation and conflict. Regulation approaches depict order equilibrium and consensus (Dahrendorf, 1959; Lockwood, 1956). Radical approaches are used by those who explain social phenomenon with reference to conflict, coercion and entropy (Cohen, 1968; Silverman, 1970; Van den Berghe, 1969; Coser, 1956). See for example Hirschheim & Klein 1989; Hassard 1990; White, 1983; Morgan, 1990.

- *The functionalist paradigm* is based around the assumption that society is objective and is

systematic in character and is directed towards the production of order and regulation. There is some distance between society and the person studying it. It therefore assumes a realism in ontology and positivist epistemology.

- *The radical structuralist paradigm* describes a world characterised by intrinsic entropy, tensions and contradictions, which are the forces behind change in society. This paradigm also considers these phenomena a 'fact' which is some distance from the observer who is attempting to 'discover' it. Again, a realism dominates ontology, and as such, studies are dominated by analysing the structural aspects which are generally seen as 'outside' the phenomenological world of the subjects.
- *The interpretive paradigm* considers social reality as subjective and without external concrete form. However it does consider the social world as possessing order and regulation and by using shared realities, it is possible to construct discourse. Checkland (1981) and Walsham (1993a) are arguably associated with this quadrant.
- *The radical humanist paradigm* is a significant movement away from the above in that it does not describe the world in terms of objective 'fact', nor does it deny the need to analyse social situations in terms of fundamental conflict. All observations are intrinsically related to the values, beliefs and experiences of the observer and change is caused by conflict in these values. At the same time this paradigm describes the human world as dominated by sets of ideological superstructures and constraints which inhibits or prevents human fulfilment.

Thus the differing interpretations of change and behaviour can be placed within the context of these four paradigms. Commonly the nature of research is dominated by sets of fundamental beliefs (ontology) and has influence on the assumptions on how knowledge is created (epistemology), and that scientists tend to be incommensurably positioned in one of these quadrants.

INFORMATION AND WORKFLOW ANALYSIS

The analysis of organisational processes, activities, roles and workflow has been one of the fundamental principles of structured approaches in requirement analysis and used extensively

in the practice of Information Systems. Diagrammatic techniques which demonstrate varied aspects of these have continued to develop (for example IDEF, Role Activity Diagrams (RAD's), Data Flow Diagrams (DFD's) with various extensions). This chapter develops the themes developed previously and argues that such analytical techniques make key assumptions about the context in which they are placed. This is of particular importance because, as has been seen, some key technologies can be applied in such a way that they appear to underestimate the complexity and changeability and of the 'defensive' behaviours of users. The behavioural aspects are seen as a 'reaction' to some of the assumptions of these, and they can act to over simplify the cognitions of the Information Systems specialist when involved in supporting end-users. Thus this section of the chapter focuses on the change in the everyday structure, flow of work and data of key information and technology workers. Juxtaposing techniques for depicting information processes and workflow; the chapter argues that whilst such techniques have key heuristic value, over prescriptive interpretation of both their formulation or in the utilisation of subsequent designs has certain dangers. The hypothesis posed is that the real agenda in many contexts with regard to such techniques, is not primarily for the Information Systems specialist to 'discover' the needs of users: rather they might be also or best considered as a heuristic device, not least for users themselves as part of a reflective learning exercise. Thus such techniques may be used for learning and heuristics, but not as simple device for 'requirement' specification, which is the assumption of many texts in Information Systems (see for example Cutts 1987; Weaver 1993; Ashworth & Goodland 1990; Eva 1990), and reflects the argument made in Kawalek 1996.

Analysing information processes, related human activities and flows of data (referred to as information workflow analysis (IWA)) is not a new concept. The essence of the techniques in Information Systems method literature are also not new, although the application of technology heightens the importance of this area (see Wood-Harper & Fitzgerald 1982). Indeed technologies that are being utilised dictates certain aspects of human activity, sometimes referred to as 'processes', 'roles' and/or 'activities' within organisations. Thus for example, workflow technologies naturally lay heavy emphasis on a pre-understanding of organisation work flows and thus human activity. A data structure assumes a certain associated human activity and as such requires a pre-understanding of the activity to which it is being applied. Study of this area is often rather central to information systems development methodologies since information and human activity is inextricably linked: the following demonstrates the sequence of considerations in a Soft Systems Methodology

approach to the study of organisational processes (Checkland and Holwell 1993):

- meanings attributed to their world by the people concerned;
- purposeful activity, purposeful in the light of the above meanings;
- information support which is relevant to the people carrying out the activities;
- data structure and ways in which they could be manipulated to yield appropriate categories of information.

The natural extension perhaps is the conceptualisation of technology to facilitate co-ordination of work activity (Malone & Crowston 1990; Crowson & Malone 1994; Mentzas 1991, 1993) and has arguably heightened interest in analysing workflow. Just-in-time, the networked organisation (Boddy & Gunson 1996) or networked organisation clusters across the value chain activities (Tapscott 1996), have also heightened the need to analyse information and workflow. Yet there are few studies which critique both the philosophical assumptions as well as the practical every day sort of difficulties in the application of techniques in this area. Thus the *raison d'être* of the current section of this thesis is to critically analyse some of the ideas and assumptions made in the Information Systems development literature, and then to discuss the implications for for the Education and Learning function within the discipline of information Systems (Jayaratna 1994). There are two sections to the analysis.

- The first outlines a the perspective on the IWA techniques, by looking at their key characteristics and the varied ways that they are used in key literature;
- The second develops a critical appraisal of the philosophical assumptions of the IWA techniques by embedding them into organisation theory.

In overview, and in broad agreement with much of the other literature in this area, the chapter argues that information processes, tasks and flows may usefully be perceived of as having levels of structure and routinisation. Data supporting processes also has different structures and levels of detail. However, it is also argued that most academic work undertaken in the application of such techniques, fail to consider or conceptualise the ephemeral nature of context: many information processes, tasks and data flows are (like organisations) dynamic and evolving. This notion is based on the premise that human information workers (to a greater or lesser degree) *construct and adapt their own* work tasks,

based on their own cognition's and '*sense of need*' (conscious or subconscious) and attachment of importance to work tasks, which reflects change in the wider organisation and society. Change of personnel has significant impact on perceived information need: as people change so does the perceptions of need in information environment and thus associated task/structures need to change. If this premise is accepted, to a greater or lesser degree, it would suggest that Information Systems specialists are applying over simplistic models which do not consider the key dynamic of change and behaviour. Furthermore it is hypothesised that at the more 'mature' phases of information technology utilisation (Gibson & Nolan 1974, Nolan 1979, Galliers 1991, Galliers & Sutherland 1991), technology specialists and 'users' are expected to 'come together'. It is argued that this is in fact unlikely unless there is greater focus on the *everyday* analysis of workflow, and on a behavioural analysis which can incorporate the variety of interests in any one context. Further if the need for continual 'tweaking' or 'tinkering' (Ciborra 1991) is accepted, then innovation at an end user level heightens the importance of this aspect; thus the activity of IWA be better seen (in some contexts), not as specification, but as an heuristic for on-going learning and reflection. However this is a rather different perspective than that presented in some of the Information Systems literature in which it is presented as part of an investigative procedure for the systems analyst in the early stages of a project to computerise individual functions or areas of organisational activity. However, the position presented is theoretically far more commensurate with the movement of organisation from highly structured and formalised work method, towards individualistic and participative work method (see for example Morgan 1993 term 'strategic turmites') sometimes depicted as a movement away from 'modernity' in organisation form.

THE THEORY: A QUICK TOUR OF INFORMATION WORKFLOW ANALYSIS (IWA) TECHNIQUES

There are various tools and techniques in IWA. Some focus primarily on activity/tasks; some are used as techniques to envisage data flow with a number of key attributes. Some are used at the more strategic level or indeed used at the lower levels of organisation activity. Figure 4.1 helps encapsulate some of these dimensions. In this the main strands of such techniques are depicted and defined, which helps subsequent discussion. The discussions can be also found in Kawalek 1996.

Area of study	Description
Strategic Analysis	High level analysis of critical units of work for success in a given industrial sector; organisation is depicted in models to reflect those critical areas.
Activities	The mapping of roles and responsibilities between individual tasks within those critical units of work.
Tasks	How data is manipulated, developed filtered and communicated, based on assumed meaning attachments.
Processes	The study of units of work and their linkage to meet organisational objectives.
Stores	The media and structure of the stores; important in IWA and linked with data analysis.
Flow	The media and regularity of transfer between different activities and data stores, within process units of work.
Operational view	A detailed view of activities. A 'who does what when' type analysis, with high levels of detail.

FIGURE 4.1: THE TYPES OF ANALYSIS ON INFORMATION PROCESSES, ROLES/ACTIVITIES AND WORK FLOW (IWA)

Any given development method of course, will contain variant levels of the above (see for example Winter *et al* 1995). The Information Systems strategy literature and Information Systems methodology literature at times overlap at the point of a type of high level IWA and organisation structure (see for example Johansson *et al* 1993, p. 209-234 on utilising IDEF within a Business Process Reengineering (BPR) type framework). Early systems developments were largely oriented towards a sort of analysis of 'who does what when'

detailed in various 'levelled' diagrams. This is largely reflected in the SSADM literature where the attention is detailed into four component parts to the diagrammatic technique: 'process', 'store', 'data flow' and 'external entity'. The technique follows the same diagrammatic conventions whether the focus of study is current system (current physical, current logical) or a proposed new way of working (proposed logical).

Other methods use similar or 'more refined' conventions. Information Engineering for example, uses the concepts of process hierarchy diagram - sometimes also known as a process decomposition diagram (PHD and PDD respectively). These help focus on process activities rather than on functions (see Davids 1992, pp.147), and interlink logically with the data flow diagramming technique. It is said to enable heightened analysis of triggers and process dependencies. The data flow diagrams in essence are identical to those in SSADM, though through the structure of IE it is claimed to be far more integrated into the business strategy which is built into the method: in SSADM the strategy planning process is a separate '*...type of analysis which precedes an SSADM project*', (CCTA, 1990, p. F-OVE - 6/7). In Information Engineering, the business plan is seen to drive and be closely associated with the information strategy plan, and the systems analysis is seen as a more general, business oriented perspective known as Business Area Analysis.

Role Activity Diagrams (RADs) are said to enhance analysis around roles and activities. A role is said to consist of activities. For example, 'project management' is a role whereas 'agree terms of reference for a project' or 'receive estimate for project' are seen as activities for that role. Different roles will have some interaction with other roles, and all of these - role, activity, interaction - can be represented diagrammatically. The value of using role activity diagrams is said to be in the analysis of roles and responsibilities, and the identification, structuring and ordering of activities which will contribute to identifiable outputs of work (see Ould 1992, 1993a, 1993b). These types of analytical devices are largely used at the 'activities' level of the model in figure 5.1. However, the 'entities' within roles - often seen as the inputs or outputs to activities - *reports, plans, terms of reference documents*, is data. However, RADs do not attach importance to detailing the store as in many IWA techniques, nor are RADs (currently) seen as part of a singular method in which the stores are detailed in related entity models and data lifecycle analysis.

INFORMATION WORKFLOW ANALYSIS AND ORGANISATION PARADIGMS

The model presented by Burrell and Morgan (1979) can help us understand the assumptions of the IWA techniques. This has already been discussed with regard to the 'objective' and the 'subjective'. However, whilst criticisms have been made regarding the 'grouping' together of ontological and epistemological assumptions inherent in the Burrell & Morgan (1979), the model also can give insight into the dimensions or levels of order within context. As mentioned in chapter 3, there was significant evidence of contextual changeability & behavioural complexity surrounding tasks and structures, dependent on the phenomenological 'constuctions' of the information worker. The IWA techniques can tend to over simplify this complexity. Of course, this can in some contexts be seen as a strength of the techniques, but over emphasising their role in specification can lead to accusations of over simplifying the changeable nature of context, and the human role in the on-going adaptation.

Modelling task structure and workflow is not *necessarily* objective nor subjective, but depends on how such techniques are used: they can be used as a depiction of a single reality (objective), or used as a model to represent different realities by the observer (subjective). However, if we assume that the IWA models are used for specification of computer applications, it is quite easy to see how they become seen as a single reality, rather than a version of it at any one moment in time. This is generally the perspective developed in the traditional Information Systems development literature. Particular aspects of work which contributed perhaps significantly (communicating in the coffee bar for example) could not be depicted on such a diagram. The use of 'informal' contacts in the world of the SME marketing managers was in fact a crucial source of data, and was a generator of change. The *prioritisation* of job/task depends on the cognitions of the information worker. Different or remedial action is taken dependent on those cognitions. Within many tasks there is little point in looking at the regular information sources and destinations (as depicted on the IWA techniques). Indeed, there are of course 'unofficial' ways that work is achieved. Goals can be highly diverse and perceptions on how to achieve them are diverse, and individual agenda's often conflict and yet it is generally assumed in the Information Systems development literature that the business rules which dictate how work is achieved are described as 'facts' which can be 'found out' by an analyst or observer. This assumes a rather objective

ontological which, it may be argued, is shared by many of the systems development techniques. It assumes that IWA techniques can be somehow detached from organisation function and culture revealing an inner layer of process function which may be more effective if those rules had not been applied. It also implies an emphasis on formal mechanisms. If IWA techniques are to be used on anything other than the most routine and unchanging areas of work, the focus must be on the *everyday* activity.

Looking in-depth at structure and task demonstrates the difficulties in applying such techniques, and shows that such techniques are not usefully seen as an 'absolute' science where processes are re-designed to an obvious ideal or optimum method of work. The analysis cannot be seen as devoid of interpretation or in some way separated from those who articulate or carry them out. Indeed this analysis has refuted this rather objective ontological assumption which has dominated some of the current systems analysis/process literature. Such literature tends to overly focus on the 'static' level of human activity and associated data. For instance see Eva 1991 pp 116; Ashworth & Goodland 1990 pp 10; Cutts 1987 pp 23; Weaver 1993 pp 134 on how a Information Systems specialist 'discovers' a 'static' data model. Ould 1992, 1993a, 1993b, Ould & Roberts 1987 articulate the principles of 'process' tools and techniques, and yet there is little that links these to contextual change and levels of consensus. For a further complimentary and parallel discussion on this type of approach, see Lewis 1994 ch 8, De Carteret & Vidgen 1995 ch 15, Hirschheim & Klein 1989. This points to the idea that systems development tools can dangerously oversimplify if used as a specification tool in all but very simple and routine areas of work. As Giddens (1984, p. 3) puts it "...'*Action*' is not a combination of '*acts*': '*acts*' are constituted only by a discursive moment of attention to the *duree* of lived-through experience. Nor can '*action*' be discussed in separation from the body, its mediations with a surrounding world and the coherence of an acting self."

ON BUSINESS PROCESS RE-ENGINEERING

In any of these techniques there is a high and low level of analysis as depicted in figure 5.1. This is encapsulated in some of the Business Process Re-engineering literature. The business process and strategy literature which has been associated with the discipline of Information Systems predominantly focuses on the skill groupings, organisation structures and strategic

opportunities for technological exploitation (Hammer 1990, Davenport & Short 1990, Davenport 1993, Hammer & Champy 1993, Johansson *et al* 1993, Stewart (1992)). Some of the BPR literature goes further by conceptualising the breakdown of processes into sub-processes each having well defined boundaries, internal interfaces and responsibilities (Harrington, HJ, 1991, p.30). Function and work can be attributed and defined to those processes; procedures formalised and documented; better feedback control enabling well defined targets and quality measurement within each process unit (Harrington, HJ, 1991, p.164). For example Davenport and Short 1990 concentrate on office processes, define a process as a set of logically related tasks to achieve a business outcome, linking industrial engineering to the office. The link is thus strong between BPR and that of co-ordinating activities within organisations (Mentzas 1991; Ang 1993). By doing this, office tasks are depicted as being routine in nature, triggered by event or status change. These trigger mechanisms can result in decision making and cause many other simultaneous or non-simultaneous activities. Each office function may require referencing data repositories, require data analysis and will have a destination data flow. Thus an understanding and co-ordination of such activities is necessary to ensure that the appropriate sequence of activities and optimisation of differing sets of activities can meet prescribed goals (Mentzas, 1993). Thus there is a strong link between the IWA techniques and that of the 'engineering' of organisation. The following discussion can be found in Kawalek 1994.

TOWARDS A DEFINITION OF BPR

During the course of the research involved in the production of the current work, Business Process Re-engineering has become a fashionable and then a rather unfashionable term, and subsequently in some circles the subject of some derision. Although there is no consensus regarding a pure 'definition' of the term, there are a number of themes which pervade the literature, and this reflects some of the more radical changes that have been occurring in organisations. This section will detail some of the major themes in the literature, and characterises BPR in a number of broad and inter-related categories: the radical approach to change; the orientation towards 'processes'; the top-down method which depicts its implementation; the cross-functional and cross organisational thinking; the competitive requirement for re-engineering; the role of technology in the re-engineered organisation; the implications for co-ordinating activities.

Interest in the last few years has been aroused and developed by a number of significant works such as Hammer (1990); Davenport and Short (1990); Harrington, HJ, (1991); Davenport (1993), Hammer & Champy 1993 and others. Most of the BPR literature has focused on the drastic re-definition of the 'processes' of organisation, with IT being a major instigator of change. The make-up of organisations, it is said, requires radical change. It is the bureaucratic assumptions that lie behind processes, built up over longer periods that are at the heart of the fundamental re-examination which depicts BPR. Thus Hammer (1990, p. 105) depicts BPR as an "...*all-or-nothing proposition*" and unable to be accomplished in small and cautious steps. In fact it is the work of Hammer (1990) which is largely credited with the term 're-engineering' and is developed as a 'radical' rather than 'incremental' change programme, in order that organisations may disregard existing procedures and structures, (Hammer & Champy 1993, p. 33). This is a theme developed in writing such as Gantz (1993) who describes re-engineering as revolution not evolution. However major change has been recognised as risky with analogies to "*triple heart bypass*" (Davenport 1993, p.171). Thus the requirement for the degree of change has been taken and more fully developed and analysed with a cross reference between the requirement or ambition to change and that of the type of program required (Heygate 1993).

The revolutionary or 'radical change' theme has been developed to describe BPR as a business or enterprise concept rather than being 'function' oriented (Hammer and Champy, 1993, p. 35). Thus the organisation is not analysed by function but by sets of inter-linked processes with radical effect on the organisation as a whole. Numerous writers have built upon and around such themes. Davenport and Short (1990) define a process approach to system requirements as a set of logically related tasks to achieve a business outcome. A process might be for example 'developing a new product' or 'process insurance claim'. Similar examples of a process are given by Stewart (1992) in order to better specify and define 'process'. Davenport (1993) develops the term 'process innovation' and contrasts it to previous ideas of improving processes suggesting that cross functional improvements requires top-down design over long periods. Stewart (1992) develops the idea behind process management as opposed to function management as it focuses on objectives rather than unit costs, the grouping of employee skills to accomplish sets of work and information movement which is blind to existing management hierarchies.

Indeed, there are insights into BPR which can be gained from such literature in terms of the concept of the application portfolio (McFarlan 1984; used widely in the Information Systems

strategy literature, for example by Peppard 1993). This classifies a system applications into one of (usually) four broad types. *Key operational* are those which support core business activities, and are critical to sustain existing business; *support applications* improve management effectiveness, but not necessarily critical to the success of the business; *high potential* systems describe innovative application areas which might have some effect on future business success; *strategic* systems innovative systems which have the potential of leveraging advantage, such as the exploitation of IT for utilising data in a cross-organisational manner. Concentration on the process seems to link most closely to the key-operational and the strategic categories as defined above. Given the levels of investment required for fundamental re-appraisal of business processes, then clearly BPR is highly strategic in its orientation, and central are improvements in *critical* business processes. The investment levels in a BPR strategy implies that development initiatives come from the top of the organisation structure downwards.

That the process ignores traditional functional boundaries is generally a central theme in BPR literature. Thus it conceptualises the breakdown of processes into sub-processes each having well defined boundaries, internal interfaces and responsibilities (Harrington, HJ, 1991, p.30). Function and work can be attributed and defined to those processes; procedures formalised and documented; better feedback control enabling well defined targets and quality measurement within each process (Harrington, HJ, 1991, p. 164). It is cross functional in the sense that it draws traditional sub-functional operations together and transcends the traditional organisation boundary. It implies a change in the overall structure and relationship of the industry sector with a more formalised linkage to customers and suppliers; automated and standardised processes it is said leads to overall cost leadership by driving operating costs below those of competitors; analysing processes enables difficulties and exceptions within the process to be better understood, preventing error and increasing efficiency.

BPR writers put together persuasive reason why dramatic re-organisation is a necessary task in many circumstances. Ford Accounts Payable is the most widely quoted example which reported a 75% reduction in staff (Hammer 1990) by radically challenging assumptions surrounding working practices and processes, enabling significant re-structuring, streamlining and involving computing technologies to automate and co-ordinate process activities. Thus the concept encompasses challenging the assumptions of out-dated methods of working and recommends fundamental process re-organisation of a business from a cross functional business sub-system perspective, with immediate competitive implications. This is somewhat

endorsed by a organisation orientated work depicting new organisation forms and structures (Scott Morton 1991). Whilst this is of obvious importance, particularly for the longer term survival of some older and traditional organisations in the private sector in North America, and whilst the potential stakes are high, the risks and complexities can also be high. This dramatic solution orientated approach has been influenced by Japanese working methods and the threats to traditional markets of North American companies (Johansson et al 1993 p.10; Davenport 1993 p. 43). Indeed it is the threats in the international market place which is the main instigator for a BPR type change programme (Katzenbach and Smith 1993, p. 196).

Furthermore the exploitation of technologies can deliver more effective working practices particularly in production and co-ordinative areas of work, and it is the analysis of the process which is the key to potential efficiency gain. The argument is that change in the assumptions stem from analysing organisations not from their structure, but from the processes and that the focus is primarily on the customer interface (Harrington, HJ, 1991, p. 5). This, it is said, enables cross functional thinking to which technology is ideally placed to exploit - with an emphasis on throughput (including information throughput). It facilitates a better and perhaps more 'scientific' identification of the relationships and synergy between processes. This exploitation of information technology results in a powerful set of concepts particularly when considered in conjunction with the traditional competitive analyses and ideas (Porter 1979, 1985; Porter & Miller, 1985; Mcfarlan 1984 and others). There seems to be powerful synergy between concepts of the process and that of cross-functional, cross-organisational use of IT and the 'value-chain'. This theme is developed by Johansson et al (1993).

Some of the BPR literature focuses on office processes, importing and inter-linking industrial engineering to the office (Davenport and Short 1990). The link is thus strong between BPR and that of co-ordinating activities within organisations and hence the theoretical work done in this area. Thus a routine set of office processes can be depicted by sets of events using graphical techniques such as data flow diagrams, petrinets, process or role activity charts, event driven diagramming tools (Mentzas 1991; Ang 1993). By doing this, office tasks are depicted as being routine in nature, triggered by event or status change. These trigger mechanisms can result in decision making and cause many other simultaneous or non-simultaneous activities. Each office function may require referencing data repositories, data analysis and will have a destination data flow. Thus understanding and co-ordination of such

activities is necessary to ensure that the appropriate sequence of activities and optimisation of differing sets of activities can meet prescribed goals (Mentzas, 1993). Thus co-ordination is a central implication of the BPR. The co-ordination activity within the broad concept of BPR has been the focus of increasing debate, heightened by the requirement of computer systems to play an increasingly important role in organisational processes. Thus writers such as Crowston & Malone (1994) identify a number of constituent elements which characterise co-ordinative activity: *goals* are the motivating forces behind an activity; activity results from the *goals*; activities are performed by one or more *actors* (humans or machines); activities can be broken down into one or more *inter-dependent* sub-activities. Thus each activity or sub-activity can have varied characteristics.

The literature generally encapsulates the *automation of newly defined, formalised and radically re-engineered processes*. Understanding the fundamental or *enterprise wide* organisation processes enables definition and re-definition of process activities and interfaces over time. Thus human activities are defined and delineated for continued monitoring, with subsequent improvement for analysis by management in order to enable continued adaptation. The approach tends to ignore existing organisation structure. Better understanding of the processes and the synergy between processes enables *high levels of co-ordination*, and technology can be applied to the automation of processes and to the co-ordinative activities between processes. The effective implementation for BPR concepts is essentially *top-down*. BPR is normally implemented by large investment with the aim to reduce bureaucracy. It is conceived from the highest organisation level in a top down manner and it is the fundamental or *key operational / strategic* areas of organisations which are likely to be subjected to re-engineering. BPR concepts are likely to be most effectively utilised and applied in key areas of business which are central to the operation of the organisation.

BPR AND MANAGEMENT RESEARCH

Summarising and reviewing BPR literature can be bewilderingly complex as it covers a wide range of areas and issues: theoretical foundations; approaches to 're-engineering' and/or change; roles for information technologies; issues for successful implementation; measurable results. Any summary such as that described is necessarily a contaminating exercise and is open to debate and interpretation. However using the above depiction, there are a number of

observations that should be made.

Analysing the BPR literature and using the definitions of BPR described above, central is the concept of 'process'. Thus BPR tends to focus on and explain efficiency gain via the 'process', based on the assumption that output of the white-collar worker is poor and at the heart of the poor performance is ineffective and in-efficient hierarchies of management (Harrington, HJ, 1991, p. 5). There are many good examples of over-bureaucratic organisations but the generalisability resulting from the over simplification of BPR as entirely process driven may result in over-prescription and result in a shift towards the 'objective'. More contingent or 'interpretive' or radical types of analyses and approaches to research in this field might suggest where and in what circumstances analysis of 'process' is relevant, the conflict of interest, and the socially laden values inherent in any one application of BPR type principles, or the particularistic circumstances (organisationally or on a societal level) in which it has evolved. There is a danger that such concepts are applied as 'solution', rather than as a heuristic guide for articulating some aspects of the need to change (learning and reflection). Indeed, it could be used as a dangerous social weapon to justify a rationalisation which is akin to the traditions of Scientific Management.

Focusing entirely on the 'process' can hide other factors such as the cultural, socio-economic, political and psychological elements which can play in the depiction of organisations as over-bureaucratic or inefficient; an approach which may ultimately yield better understanding of how to avoid future trends towards ineffective working practices. Indeed, given the relevance of a BPR type approach to change these 'other' factors will have implications for the change required for effective streamlining. These factors are utilised in BPR literature (eg Johansson et al, p.196), but are often treated as rather incidental.

Analysis and understanding of the business process is said to help in the streamlining the organisation for efficiency. However, the type of language used in the literature is quite 'objective' in character. Thus correctly designed processes it is said, will have '*...the voice and perspective of the customer built in*' (Davenport 1993, p.15). BPR is justified as some form of service to the customer. Other, or contradictory vested interests (such as employees, shareholders) or the questioning of the basic assumption that it aims for profit maximisation are interestingly not given. Conflicts of interest are not described in detail, resulting in a sometimes simplified view of productivity, cost effectiveness and efficiency as if there is a single organisational goal; pluralism or conflicting interests and power tend to be seen as

minor considerations which will succumb after the realisation of the 'truth' and better working method that results from BPR. These factors are not easily measured in the implied 'objective' manner, particularly in complex pluralist organisations with a multiplicity of goals and values. Consider the case of the utilisation of IT in the National Health Service in the UK which highlight the conflict between the motivation for high turnover and reduced costs with that of patient needs (Jones & Worsdale, 1993) and 'radical' change encapsulated in Compulsory Competitive Tendering (Kawalek & Hackney 1998). Conflict is only seen as something to be controlled (see Sockalingham & Doswell 1997), rather than being seen as an opportunity to innovate. Indeed over-simplification and concentration on the 'process' may impede other better alternatives to heighten organisation objectives. For example, and as already implied in the current work, better use of or more intuitive and innovative approaches to information to support effective decision making might be hidden by taking a purely process orientated approach as depicted by BPR. It does not consider diversity and learning as a positive contribution, as it deals with organisations as having common objectives, and assumes that largely there is common understanding on how those objectives are to be achieved.

Challenging assumptions surrounding out-moded working practices and processes, which pervades the BPR literature makes little reference to the difficulties of identifying *which are* the out-moded practices. It tends to be seen as an objective exercise, again. The suggestion at its most simplified level is that consensus regarding which are out-moded practices can be almost simplistically alluded to by 'rational' analysis based around 'engineering' principles. The role of the consultant or BPR champion tends towards that of 'objective' systems expert as described by Hirschheim & Klein (1989) who can lead the way towards more effective working methods (see for example Harrington, HJ, 1991, p. 28-30). By concentrating on the processes a better understanding of the work structures may well ensue, but perhaps there could be more recognition that actors involved in this interpretation process cannot be entirely 'objective'. They are themselves representative of a set of social values, making socially laden assumptions about the imperative of profit, skill level and working conditions. Whilst individual actors in the change program may not reflect on the such like, it seems that certain academic work is also unable to reflect on these aspects. Perhaps academic work in Information Systems is unable to stand back and be reflective because of self interest or perceived need for propagating such theory. Academic work is not consultancy, and this highlights the difference between Information Systems theory and practice.

The capture and complexity behind requirement analysis is a intricate, political and a chaotic activity whether BPR or other type of label is used to describe it. Thus, replacing out-dated processes with new ones cannot be seen as an entirely objective exercise full of logical reasoning and mathematical precision. The concentration within the BPR literature is therefore separated from the complexities of requirement capture and the socio-political factors, and results in a depiction of BPR which treats change as rather mechanistic and scientifically logical. There are many good and valid examples of the appropriateness of such an approach (eg Johansson et al 1993, p.60-83), but the generalisability and validity of such approaches requires further contextualisation. It seems that applied wrongly or over-simplistically interpreted, BPR results in some form of *deja-vous* of scientific management (Taylor 1947). The over-simplification of the change mechanisms in organisations can result in an over-deterministic view of human nature. Humans do not easily see the advantage of new methods of working and there is rarely consensus achieved about the characteristics of 'better' and 'effective' working methods.

The examples of appropriate use of the 'process' approach may stem from the context or business nature of the processes undergoing change. Some organisation activity are indeed rather mechanical and routine in nature, but many business activities are highly complex with many anomalies and exceptions requiring intuitive intervention. Useful grounded examples of the applicability of the process have been provided by the Informatics Process Group at Manchester University, and referred to in Wastell *et al* 1994. The cases referred to indicated a certain validity in a 'process' oriented approach which is somewhat loosely related to some BPR principles. For example, concepts of drastic and radical re-definition of processes seemed less appropriate than more flexible enhancement and piece-meal concepts applied in a process type manner. For example, the billing processes at Telserv were already highly structured and effective; human intervention was required to deal with more intuitive 'exceptions'. The IT application required adaptation and enhancement in order to handle the billing process more effectively. It was found that the invoice production process required greater discretion by the invoice production staff to respond to customer needs. In a similar way, in the outpatient section of the cardiology unit, departments were given more autonomy within the context of greater decentralisation of control. Constraints in existing working method again were identified as a problem. There are other examples where the 'idealised' change that is assumed to take place under a banner of BPR is in fact much more an on-going, nurturing, reflective and developmental process. The applicability of the drastic process re-engineering and application of simplistic 'rational' models seems in-appropriate in

such cases. This radical 'break the china' (Johansson et al, 1993) characteristic originally developed by Hammer (1990), Hammer & Champy (1993), Gantz (1993) and others should also be critiqued for contextual validity. There is no doubt that radical change has proven a useful and important concept in many organisations. However it could be argued that the experience of the USA is likely to be very different to that of organisations operating from (primarily) UK markets. Radical shake-up of many UK organisations it might be argued started in 1979 and thus the radical nature of BPR will be of less relevance perhaps opening an opportunity for (perhaps) a semiotic study of BPR within the context of recent industrial history in the USA. By doing this better understanding of the relevance of BPR in UK organisations may be achieved. The applicability of a radical approach to re-engineer the organisation needs theoretical underpinning by the utilisation of grounded examples

Extending simple modelling in helping to conceptualise a relatively simple computer application such as defined by the term 'transaction system' as depicted in chapter 1, is not the same as 'modelling' an organisation. Such models and ideas that stem from these should only be used as retroductive and learning devices (see Bhaskar 1979, pp. 15; Hanson 1965, pp. 85; the discussion in chapter 2 of this thesis). They are cognitive devices similar to metaphor or analogy, which do not depict reality, rather a heuristic from which humans can reflect. Human activity is often complex, often unstructured and intuitive, characterised by inconsistency (Peters 1989, Russell & Muskett 1993). Some depictions of BPR and application development literature seem to underestimate such factors and emphasise the unchanging and undynamic nature of tasks, and certainly do not include the need for reflective or critical reasoning skills. In essence, this argument shifts the epistemological ground from the assumed 'objective' to the 'subjective'.

However it is reasonable to argue that BPR has a certain significance. Why is it that its popularity occurred at all? Concentration on the 'process' is perhaps a response to global economics and the 'postmodern condition' (see Giddens 1990). Its value laden assumptions cannot be ignored by academic work in the area. At worst, perhaps BPR and its more mechanistic application is a throwback or denial of an increasingly complex world - a sort of reflexive-modern 'reaction' akin to 'fundamentalism': it grasps to a single view of reality and the prescription of BPR and associated techniques is a 'solution'. Its theoretical underpinning is certainly questionable, which perhaps explains its 'fadish' type emergence, and its relative failure. However, more importantly perhaps, is the influence it has on the discipline of Information Systems, and on the Practice of Information Systems. Like the 'design'

techniques of Information and Workflow Analysis, it enables a certain evasion of dealing with the messiness of understanding behaviour, evaluation of information at an everyday level, of learning and innovation (Checkland 1985).

REFLECTIONS

Adherence to designing roles and fitting human beings to them is a dangerous (yet sometimes a necessary task). It is dangerous because people are not machines: rigorous application of (for example) role activity diagrams might be deemed a sort of Tayloristic notion. Further, there are good reasons for organisations to be designed with what is sometimes seen as loose coupling: the IWA techniques tend to under emphasise and undervalue the relative merits of this (Weick 1976). Thus human activity at work is a construction by the human him/herself. Human roles cannot be designed rigidly for him/her but (in an informal and ad-hoc manner) *by* him/her. To treat certain areas of work as some sort of black box with prescriptive notions of inputs and outputs is to crassly oversimplify and is using systems in 'ontological mode' (Jayaratna 1994) (for a complimentary discussion see the example of Pineapple Computers in Wastell *et al* 1994). Whilst recognising the importance of planned change, perhaps via the designs depicted using IWA techniques in application development methodology, it is necessary for information workers to have a stake in that design. This is one of the fundamental principles of socio-technical design. Seeing techniques such as IWA in methodology as a formal component of requirements, misses this point: it assumes that users can be in some way cajoled into alternative designed visions (see Plant 1987) which are best seen as snapshots in time. However, even this misses the further argument that humans play a key creative and innovative role in the change process in an *on-going manner*. The changing perceptions of key work tasks is also a *generator* for change, and perhaps should not be considered subversion (see Sockalingham & Doswell 1997).

Whilst not wanting to over-emphasise the changing perceptions of job/task/role, it is clear information job tasks display some highly individualistic traits. Whilst in the practice of Information Systems there has been a certain focus on the subjectivity of information (i.e. subject to individual interpretation) (see for example Liebenaeu & Backhouse, 1990, Galliers 1993, Checkland 1992), it also may be useful to view job task and structure as having equally individualistic traits and transformational sequences. Traditional application of IWA techniques tend to under-emphasise such attributes of organisation context and this has

certain dangers if used inappropriately.

The dominance of techniques and ideas such as those described can be used in a way to ensure that the decision making is separated from certain key stakeholders. As is shown in the following section these dominant assumptions play a significant role in certain behaviours at the end-user level and their interaction with Information Systems specialists.

CHAPTER 5

END USER 'ORIENTATIONS'

Managers, it seems, often ignore formal sources and systematic studies not through personal ignorance, lack of training or personality defects, but because personal media are capable of providing richer information when they are working on certain kinds of problems.

H. Butcher, 1997, p. 30

INTRODUCTION

In the previous sections, the primary concern was to develop a insight into key dimensions of the research problem akin to the early open coding of inductive method (Glaser & Strauss 1967, Strauss & Corbin 1990). It used varied instruments in trying to gain dimension focusing, particularly on building the case notes and categories specified in inductive method. Out of this, the section that follows is designed to give a justified account and generation of grounded theory of the subjects phenomenological world. The approach taken is achieved via an Analytical Inductive process derived particularly from Bloor (1978), and articulated in chapter 2. The next stage was to explore in a much richer manner the phenomenological world of the subjects.

I. GAINING ACCESS

Gaining access to a case study is always often to the academic researcher (see Buchannan *et al* 1988). This was of some concern in the early stages of investigation. It was felt that an in-depth case study would be necessary to gain insight and dimension to the motivations and phenomenological world of end users of computer applications which were developed and applied by themselves - ie not mediated by the Information Systems specialist. Rather naively, it was expected that organisations would be happy to involve a researcher, and access would be easy. Having approached two large organisations via official channels, it was obvious that access was going to be more difficult than first imagined. The first was a large corporate who had previously promised support. However, due to change of personnel, that support was not forthcoming, and there was a sense of mistrust when a new senior manger

was approached. That resulted in the recognition that a new senior manager did not want the distraction of a researcher who might be crossing 'boundaries': it would be OK to look at 'applications' from within the section (ie line managed personnel) but not beyond that. There was some sympathy expressed, but it was a firm "no" in the end. The second organisation was equally non-forthcoming but in a different way. They offered 'assistance', though it had to be approved by senior management, and they would provide a few 'useful people' to talk to. The support was to enable a questionnaire to be submitted to these 'useful people'. In hindsight the negotiation was done rather poorly as it was difficult to make clear the research question or the method. The view was that the researcher might take time, a little inconvenient and/or even threatening. It was decided that this level of control in the work was (despite being well intentioned) less than helpful as it meant not being in control of the key personnel being interviewed.

The tactics moved from being completely open with the key intentions, to one of being much more manipulative and cunning. A training course oriented towards non information systems specialists was consequently created, and run for a local training company. This training course was done many times, and 40-50 people were trained in a period of just over a year. The training company was not aware of the second order intentions - that of research, though as long as the trainees were happy, there would be no questions asked. These training courses were two day introductions to Visual Basic for Applications. The training course took about seven days to develop from scratch, though in addition there was a steep learning curve in order to get the necessary language skills (primarily learning about the methods and properties of the various commonly available objects). It was from these that informal and trusting relationships developed with a number of such 'users' who attended the training courses. Suddenly, the possibilities of gaining access were opened up as such 'users' had a stake in the research in the guise of somebody willing to assist with technical problems as they arose. In this manner, the aims of the research were very much hidden, and therefore observation could be developed without 'interference'. The researcher-subject relationship was seen by those participants as simply assistance at a technical level. This technical level assistance was difficult to maintain; it had to be *only* technical level assistance (help and suggestions regarding the application), otherwise the phenomenological world of the subject may have been compromised in terms of the reasons and perceptions of *information* need. A single large corporate sent a number of its personnel on one of the courses, and it is these people that provided the following case study.

Subsequently, access was sanctioned by the guise of technical assistance. Most subjects were surprised at the use of the tape recorder, though no objections raised. Indeed, the trusting relationship developed over a long period, to the extent that home phone numbers were exchanged, many other people became personally known, and even by playing football for the company team at a local sports centre. Huge amounts of data was available, and scurrying to get notes and thoughts down after a game, or a chat in the pub afterwards, became rather normal. It was never felt that there was any sort of compromising of confidences, as there were no 'winners' or 'losers' and no managerial reports. Thus the original approach in gaining formal access via a member of senior management, who would 'vet' the access was seen in hindsight as a potential source of interference, and ensuring that things developed based on mutual trust and informality was a way to gain insight and dimension without intolerable 'gatekeeping' or by being associated with formal management and leading the subjects to be attributing particular characteristics, which would have influenced responses (see Trice 1956). It meant that the attitudes, feelings, motivations and some of the 'deviances' from the 'correct' or most suitable or contrived responses.

Yet there was a deception of sorts. However, in developing a trusting relationship, this was not questioned. Discussion on feelings, attitudes towards the host organisation, motivations and information handling at the user level necessarily followed. It was precisely because of the relationship that it was successful. Yet managing the trust relationship and the 'psychological contract', particularly in the early stages, was very difficult. However, it was a case of the researcher being seen as "*... not really studying them ... he tries to show them that he is really studying something else, with which they are ... involved.*" (Douglas 1976, pp. 170). Therefore the technical application and the strategy formulation and implementation was seen by the subjects as the focus. The company were implementing a large SAP R/3 application at the time. The interaction with the various stages of this implementation, the subjects' concerns, motivations and attitudes were the focus of study, and the impact that these issues had on their own perceptions of information need. By keeping a distance on the one hand, in terms of the focus of study, and the need to build trust in relationships was a constant difficulty.

II. ON RESEARCH 'PROCESS'

The case that follows has been developed over a 15 month period between February 1996 to July 1997. Its focus has been on issues, concerns and activity of the *everyday* utilisation of

technology. In focusing on the information work and technology application of twenty five information workers within or closely associated with the Accounting Services of a large multinational corporate organisation. Six of these were used at a later stage in further detail, and who became quite close friends. The data used was collected over the 15 month period, and included 24 tapes of interviews and various recordings, several official 'strategy' documents, unofficial notes and numerous bits of scribble on paper, summarised transcriptions of over 34,000 words, and many notes on varied writers which it was subconsciously hoped would provide the 'answer'. As mentioned, even football games were played, in the quest for better data on attitudes and motivations. The initial quest for 'perfect' data of course, was not forthcoming. The learning involved in research is quite brutal, and the process of research for the novice is far from linear: clarification of the theoretical perspective then, quite suddenly, dictated the key aspects of the case that were to be presented (below). On reflection, this was the point where there was the realisation that qualitative research is not about the collection of huge amounts of data: it is about *ideas and meaning* and structuring it to form a valid and argued perspective. Data is there to help generate and explore the dimensions of that meaning, but to over-emphasise the need for interpretive validity, where data is in some way 'objectified' is in fact dangerous in two ways. Firstly it is an attempt at gaining 'objectivity' of human constructions; on-going searches for validity in interpretive research which can 'purify', like mathematics, or geometry (see Ciborra 1997, p.1552), seeks interpretation which is separated from the constructor. Secondly, in trying to establish 'objective' science, *meaning* can be lost: the quest for 'objective' or 'pure' data is as if research method becomes a fetish or 'social defence' as systems development method has been argued to have become (Wastell 1996). Yet the quest for validity and justification in the construction of meaning is fundamentally necessary.

The data collected was in fact too much to handle easily. This is crux of research: familiarity with the key research theory to be applied in a focused way, and using data to inform, verify and structure out the theory. In fact this is where the importance of historicism comes in: the theory dictates the 'facts' that we use - not vice versa. Waterloo and Peterloo are events in history which both in their way contributed to modern social forms. But which was the more important? Of course the question is rhetorical and that depends on the position of the observer. The discipline of History has long seen the problems of this theory-data relationship and the exploration of meaning from empirically rich and diverse data (See Elton 1984; Fogel & Elton 1983; Jenkins 1995). This is the key crux of the problem in more empirical accounts, which is dictated by the approach taken. In fact, the data for the current

work was highly diverse and thus when theory developed focus, selectivity became possible. Thus the separation of data from theory, or data from the observer is impossible, though the perspectives that are constructed in the following sections can be seen to have justification and validity. That validity is demonstrated in the process of construction. Therefore, that process is of key concern to the current section.

III. ORGANISATION BACKGROUND

Oxygen Suppliesⁱ UK is a wholly owned subsidiary of the Oxygen Supplies Group. It is a well established manufacturer and distributor of industrial, medical and speciality gases. Although currently a market leader, there is general recognition that it needs to meet increasing global competition. The company are currently undergoing changes to enhance its global competitive advantage by becoming increasingly customer focused. As one senior executive put it, it is *"...to become the most customer focused businesses in the world"*. To achieve it, they see the need to combine business process change, multi-skilling, and the development of outsourced partnerships. The Strategy document details plans to include:

- a *"disciplined approach to re-engineering tasks"*;
- recognition of *"the need to change culture"*;
- the ability to *"support claimed successes with heightened measurement techniques"*;
- development and enhancement of *"strategic partnerships"*;
- the development of a *"multi-skilled workforce with information and communications technologies as enabling factors"*;
- the application of *"organic and flexible structures"*

One senior executive involved in the Information Systems section, with the charge of implementing SAP, pointed out that there was obviously awareness of the failure of previous attempts to streamline business activities using information and technology as a key enabler; *'...we tended to computerise functional units of work without really getting to grips with the bigger picture'*. There was awareness that computerisation was previously only partially successful. This was reflective of the thinking in the Information Systems section rather than *necessarily* being based on a critical application of that assertion. Here was a senior management advocating the new SAP implementation, having a vested interest in it, and shaping his world to that vested interest. During the same interview, there was reference to earlier attempts to apply

total quality management techniques and the application of technology to *'automating existing processes'*. Again, a convenient phenomenological picture of the world with a vested interest. There obviously had been an enlightenment in a few short years, whereby there had been a recognition that some of the previous attempts had applied technology to *"...relatively inefficient processes"*. Rather the new mindset centres around a perception that there needs to be *"...a more radical shake-up in structure, corporate culture and working method"*. It is now seen as attempting to *"...achieve innovation amongst key individuals"*. For this interviewee, this was reality, not something to be questioned or reflected upon.

THE STRATEGIC VISION - THE GLOBAL DIMENSION

The stated intention of the group was to evolve from an international company to one which is global, which can more readily capture global efficiencies of scale, lever opportunities world wide, and to develop in global markets. This is expressed in five key priorities of *"visions and values"*: that of strategy, quality, information management, core competencies and talent management. Based on these, Oxygen Supplies UK are part of a global strategy in a market which is increasingly competitive particularly in atmospheric gasses - Oxygen, Nitrogen, Argon. As one middle manager put it: *"OS [Oxygen Supplies] is very hung up on market share at the moment...."*. Further, Oxygen Supplies UK perceive that they face reduced profit margins as a result of customer demands for quality products and services at lower cost. Although still very much dominant in the UK market, two competitors in particular were identified, and at the time of writing, were setting up plants in the North of England, which were identified as rivals to Oxygen Supplies. These organisations were of Canadian and Scandinavian origin respectively. Operating costs and administrative overhead were therefore identified as critical to the overall overhead cost reduction which was 'unofficially' set at 25% over the following three year period. This was verified (as unofficial rumour) by several staff, and came out in discussions. Interestingly, it seemed that this view of the competitive market place was (in general terms) well understood by the middle managers that were interviewed.

There had of course been earlier efforts at reducing costs. During the late 1980's there had been a total quality management initiative which attempted to lower costs through less duplication of effort and greater co-ordination. It was believed that there was some reduction in cost, but it seems that the effectiveness of this was difficult to gauge because of a lack of

effective measurement. Other systems were put into place, which did not question the effectiveness of the current operations. Thus longer term benefits were hard to assess, though it was perceived to be successful in the shorter term, and at the time. In the words of one It was generally recognised in the group that *"...wall to wall flow charts which were then automated on new hardware without challenging the way business was being done, and only resulted in short term benefits."*

IV. EARLY ACCESS

Because of the nature the 'cunning' manner in which access was gained, it was thus important to sell a set of skills as a way in. Then it was necessary to ensure that appropriate interviews with appropriate individuals should take place. Issues regarding the presentation of the self was of utmost importance. It was important to put individuals at ease as far as possible. It was important to create a trusting ambience, and it was important that the subjects chose a convenient place and time to meet. It meant visiting the site many times, and avoid being seen as an 'academic'. Dress codes of the company - not academia - were followed, though (it was decided) in a slightly casual and un-intimidating way. Searches on the company had been already undertaken, knowing its recent history, the organisation structure, the re-structuring that was being undertaken, the subsidiary companies that comprised the group, the financial position. Indeed, there were one or two occasions that it became obvious that the background knowledge gained by two days in the library looking at various company databases and searching the World Wide Web, resulted in a clearer understanding of the organisation and its strategies than those working there. This in fact developed into an important observation about the level of awareness of some of the key objectives of the company and its wider group, and opened up a key element of the research theme, developed during interviews.

There was some anxiety on the presentation of the self, and whether or not the key people would be open enough. In the course of events, there was little need to worry. The first set of interviews were arranged over a whole day, and moving from one staff member to another was pre-arranged without prompting. The individuals concerned were very open and relaxed; even lunch was arranged by the Accounting Services section. The individuals concerned were keen to discuss their applications and immediate and open discourse took place. Despite the (quite surprising) openness, it was essential to appear personable,

approachable: “small talk” and small jokes helped the flow of mutual trust (see Goffman 1972). That first day, five people were interviewed, each of them willing to discuss their various applications of the technology, their intended new applications, their frustrations, the problems (both technical and organisational) that they encountered, their perceptions of what they ‘should have’ in terms of further resources (technical, information and time), the reasons they were doing what they were doing. The first day was exhausting, but was encouraging.

As such, and over a period of several months, and as mutual trust continued to develop, it was possible to meet many user ‘developers’ who were using different technologies for a wide variety of purposes. There were many who were applying more than one technology in a variety of ways and on initial investigation, it seemed that despite a well rehearsed strategy for information rationalisation around the implementation of SAP R/3, the users were applying technology in a huge variety of ways: it seemed like a *car boot sale* full of oddities and serendipity, as well as the very ‘rationalised’. In fact, it seemed an ideal testing ground: lots of information work - quite natural of an Accounting Services section; lots of diversity and a large change underway in SAP implementation. It was decided to interview as many as possible, at least twice: the first being exploratory in order to generate structure and dimension, building on some of the ideas developed in earlier sections of the current work. The second was to help develop theory, and thus a movement towards greater structure and dimension. It was a strategy which was deemed to be ‘progressively focused’ (Hammersley & Atkinson 1983, p. 175-6) as in analytic induction. The account of the fieldwork that follows is based on a chronological set of events, though it became rather fuzzy as opportunities arose outside the assumed ‘designed’ progression of events in which the research was expected to follow. However, more importantly, observer-identified themes and categories emerged derived from accounts and issues (see Agar 1973). This was largely done after the first set of interviews, and after exploring the taped discussions.

The case is presented in three component parts, each of which form the three chapters of section three: a. User accounts of their applications; b. development of case features; c. ‘testing’ of theory.

V. USER ACCOUNTS OF THEIR APPLICATIONS

During the first round of interviews, the primary goal was to build trust and at an

investigative level, elicit informants perceptions of their own information need expressed in their user oriented applications of technology. To this end all interviews were taped. During the interviews, it was necessary to guide the conversation around from the technology application itself towards the user perception of information need, in an attempt to *expose their motivations and constraints* on their own action, given their differing perceived roles within the organisation. These conversations were obviously contingent on the ability to share understanding, represented by the dialogue and words used, and this necessitated some skill and intuition. It entailed 'remaining silent' at times, not to allow the imposition of ideas and concepts on the part of the observer. Yet even the questions made implications about 'correct answers', and it was recognised at an early stage that such answers were often couched in language in an attempt on the part of the subject, to justify a particular application of technology. Indeed, in the questioning, it was important not to lead the observed into a particular direction. Yet this is an objective of qualitative research which is rather inescapable, regardless of researcher skill. Unfortunately, on analysing the tapes subsequently, it was recognised that in the eagerness to develop the conversations, the subject recounted issues and concepts that moved beyond the objectives of the initial interviews. Yet this was a skill that developed over time; during which time, there developed a confidence in being able to guide the conversations to the issues of greatest interest at any particular area of interest at any stage of the fieldwork. Comparing the user accounts was done with a view of identifying similarities and differences amongst the group. This grew to be comparisons and relationships with other phenomena - not just a comparison of views amongst the selected group. This in fact happened quite naturally, and is identified by Glaser & Strauss (1967), p. 106 as being akin to their 'constant comparative method'. As already mentioned, five users were interviewed on the first day. There followed three further days of interviews over a five week period, in which 13 further users were interviewed. This was deemed sufficient for the initial first interviews, though a further 7 people were interviewed as a consequence of being invited to do so. It seemed to prove that the individuals concerned were getting a great deal from the 'contact at the university'. In each, care was taken to identify information workers at a low to middle ranking 'managerial' or senior clerical level. Most were from the Accounting Services section of the organisation, though six had been 'seconded in' as a result of the SAP implementation from other parts of the organisation. After the initial 5 interviews, confidence grew, and so did the trust. After that, access became much easier and the initial group of 5 introduced many others, and the selection of the following 12 was made quite easily. The further group were seen to fit the sample. In the intervening periods between interviews, there was inevitably a growing focus, and indeed a

good deal of learning in guiding the conversations with the least possible interjection or imposition of concepts and ideas. Indeed, during the latter interviews (following the initial five), the conversations broadened to the background of the informant, rather than being focused on the justification and motivation of the technology application. As can be seen in the appendices, the technological sophistication was often high; but the motivations behind the applications were much less than obvious. By looking at the underlying motivations rather than the technology application was in fact quite revealing. From the initial sets of interviews, the interviewees were categorised initially into four groups termed as follows: “Opportunist”, “Defender”, “Doubter” and “Realist” and “Frustrated Realist”. The reasons for developing these categories and their meaning are described below.

Opportunist: this was derived from the characteristics of a user, having a dabble with the technology, exploring its potential and trying things out, seeking out opportunity for its application. It was a category which for the reasons outlined later, was in fact dropped for the development of further analysis.

Realist: Saw his/her technology application as ‘right’ in the situation. Would not tend to question its validity, nor the information associated with the technology application; further, would not question the associated tasks and structures, as being valid and appropriate. This category was later expanded to form two categories - that of realist, and then also to include ‘frustrated realist’ - where the subjects justified their applications because of a genuine ‘frustration’ with the centrally developed applications - or because of identified needs as being somewhat a ‘stop-gap’ until the applications were ‘put-right’ in some manner. It was a reaction to the limited nature of the ‘adapatability’ or ‘controlability’ of central applications.

Doubter: those who doubted the validity of the current procedures, rules and norms, and this translated itself into technology application: that the technology application also was unlikely to be correct or appropriate, though may provide *personal* opportunity at any one instance in time. It was characterised by a certain questioning of the self, and of key issues in context which translated itself into technology application.

Defender: those who used the technology to prove their value or worth in the context: focus on the indispensability of the self by developing technological applications which few others would be able to use. Characterised by an defensive attitude, and the utilisation of the technology was to prove personal value, or indispensability. The language used tended to, on

the one hand, openly admit such motivations, and then shift to an attempt to 'rationally' justify that action.

In fact the category of "Opportunist" was eventually dropped, because it in fact spanned the other the others, and did not provide a fundamental focus on any single application and therefore could not be explored in terms of the objectives of the application, or of the personal motivations behind it. This became apparent because of the realisation that the focus must be at the application level, with the personal motivations following that application. The focus was not on the 'person' who was separated from the application(s): the focus was on the personal motivations (termed here as 'orientation') of the middle manager information consumer of a particular application. The characteristics each of these categories are described below, with examples of key interviews, which demonstrates why these categories were developed. Words in square brackets are inserted by the author to aid understanding.

REALIST

This is a category which emerged from the initial set of interviews which is a particular orientation towards their own applications of technology as being the apparent acceptance of the logic of the application as 'the best' way of organising data and information. This was seen as absolute in the phenomenological world of the interviewee, and was articulated by several members' descriptions of doing work in the way that they did. There was no better way: it was obvious that using a PC for some form of information processing was 'the best', and was the most appropriate. This is summarised by Martin.

We've got to check the validity of the data..... its got to be right [ie the data]. The only way to do it is use a PC, because we can ensure that the checking is done the best way... it is programmed [using Visual Basic] to automatically take data from the mainframe and do appropriate routines to ensure that the data is correct.

Later in the interview, a further attitude towards accounting data was revealed.

You have got to accept the financial facts. It is no good hedging behind anything but the facts. We just present the facts ... like any responsible accounting division. We take data from the mainframe and therefore can control the data better.

There was a certain fuzziness when it came to why the new SAP implementation was not doing the checks. It was revealed that it was not just validity checks that were being manipulated.

We want to download the data. Well we can control it then. We can check it, and if there is a discrepancy, we can move the cost code: it makes sure all costs are allocated to the appropriate account and then it is upload it again. Its our key function - to ensure the books are correct. We've got to make sure it adds up.

Researcher: *Why is it done on a PC. Surely the new SAP implementation can handle it?*

Well yes it probably could. But this way we have more control over it. We can do quite a lot of manipulation on a PC. Otherwise we'd have to get others involved, and they're too busy with SAP.

Researcher: *Will it be implemented on SAP after the full SAP implementation is complete?*

No. The thing is that we need control of the data, to make sure it is correct. Yes, its a lot of work, and the data download is a bit messy, but that way we can make sure it is correct. Thats why we need VB [Visual Basic].

Researcher: *So SAP is not good enough?*

No its great. Its much better than the old system. I found that impossible to use sometimes. It was all different menus getting [correct data on] cost accounts was a nightmare. That's why we did a lot of work on PCs.

Researcher: *But SAP gives you figures that need checking? That suggests that it is not completely right doesn't it?*

Its not that it is not right; it is more that we can control which cost account certain costs go into. Its something that we have always done, but whilst we're at it we might as well do a load of [validation] checks.

The above conversation was singled out as it showed an unquestioning 'orientation' that doing the work in the way that it was done, was absolutely correct. There was no questioning of it in the mind of the interviewee. The PC had previously offered more control, and it was right that it was the best way of doing it.

A further example of an assumed 'realism' expressed in application examples was detailed by Jane whose application had been developed and devised to 'rate' the performance of various bottling plants.

We use this model, and every month we take data from various plants and rate their performance.... It is based on some simple analysis.

It was revealed that in recent history, the local bottling plant (on the same site) had come top each time, based on these criteria. Yet there was no questioning of the criteria - these were seen as 'objective' and real.

Yes, our performance has been very good. We've been very pleased, and the model shows that in all these changes, we are in a strong position. I don't think there is any danger of us being closed down.

The technology had made the model real. It seemed like common sense that the criteria in the model were right. The model had been used by senior decision makers in the organisation, and Jane revealed that she had been gratified by *the thanks of a senior manager in HQ.*

Researcher: *How did you go about devising the model?*

Well, we've been using it here for quite a few years now. I just did it on a spreadsheet. That way the calculations can be done quickly... and now others use it.

Researcher: *Did you look at other plants, to see how they did it?*

No. We were the first to use it

There followed a slightly tongue in cheek comment.

Well we are probably the biggest bottling plant, and probably the most advanced. The best really!

Researcher: *And your model proves it?*

Yes.

Researcher: *You mention about being closed down. Is that a real threat?*

Oh yes. We've been told that we are competing with each other. I think we're safe, but there is on-going change, and we're kept on our toes. We know that things are going to change a bit...

Researcher: *Is there more competition with other companies in your area of business?*

I'm not sure really. I've heard that a Canadian company that has set up in Leeds. [It was in fact a Scandanavian company]. That will be more competition....

These two accounts demonstrated that the applications were 'real' and 'objective'. Two key points were noticeable in Martins account. Firstly, the control aspect of his application: it was important to maintain control, and this was couched in terms such as 'flexibility' and getting the data 'right'. That they were moving costings between accounts was seen as appropriate and reasonable. Secondly, the fact that the data handling 'had always been done that way' was also noted. 'Always' meant pre-SAP. In the second case, investigating the appropriateness of the model was not questioned. Even though it may have been perfectly good, there was no investigation on the validity of the benchmarks: it was a model built from automating what was already there: this might be seen as perfectly appropriate for internal (site based) checks on performance, but as a tool to be used generically may be better perceived of as an organisational issue. Other observations from these discussions arose in that each one saw their models and ideas that were expressed in them as correct in an absolute sense. There was no questioning of their validity. The discussions tended to be a justification of them, rather than a discussion of their relative merits. In fact, discussion on their relative merits were beyond the scope of the researcher because of the fear of insulting the interviewees. Much of the conversation was oriented towards the 'admiration' of the applications, not the critique of them. A further application demonstrated a certain 'realism' in that it assumed a single right or unitarist vision for the organisation. As Phil recounted his own use of technology.

We've been told by HQ that our revenues are down. I've been working on a model to help predict growth in sales in various areas of our business..... Its a matter of talking with sales and making predictions..... I need to model it, to make sure that these are accurate.

Researcher: *How do 'they' know whether the revenues are down?*

Well that's what they tell us. We've been squeezed on the pipeline gases for some time now. That's why the bottled gases are so important to us now.... Its sink or swim together nowadays.

Researcher: *Have they given you figures?*

Yes, we need to pick up 12 to 14% more sales revenue from last year. That's a difficult target, but its something we've got to meet. That's why I need to model all the potential sales and keep a tab on what is being sold each month, and make appropriate adjustments according to sales figures. If we're down on one, we'll need to push another harder. I get reports now from SAP and try and predict targets I can put in a load of 'what-ifs' ... so that we can meet the 12% increase.

Researcher: *Sounds a very difficult target. Do you think you can do it?*

Probably not... But I reckon we'll be damn close.... As you've seen, we need to increase the health care side [Health care was used synonymously with bottled gases].

Here there was no questioning of the sources of the data to increase sales. The accuracy or purpose of such targets was not questioned. The data that was being manipulated was a result of these, and were seen as absolutely correct, having 'come from above'.

Yet this 'realism' seemed to be reflected in other accounts of different applications. It was seen that there was also a 'realism' that derived from a certain frustration (in meeting a set of objectives) in current information sources. This led to differentiating the 'realist' category from a potentially new category of 'frustrated realist'. In these cases the application on a PC was seen as a 'stop-gap', with the recognition that the central applications had some information limitations. This was shown in the accounts of Diane, who saw a part of her work as dealing with what was termed 'GOMIS'. This was the Gas Operations Management Information System. This is not integrated into the other applications, even though it is developed using the same IMS database. One of the key outputs is the ratios of number of cylinders filled and the associated hours worked. Each site (including Brinsworth) competed on the effectiveness derived from such ratios. However, Diane was involved in producing extra ratios based on the data within GOMIS. These included such analyses of different

types of cylinders filled, changing trends of demand for differing types and associated trends. The drive here was for effective information BEFORE the accounts would show decreasing sales or poorer ratios, and would involve substantial integration with other data. The data was downloaded into Excel for this purpose. This work would be done by one of the team, and would take approximately half a week every month. There was little conscious questioning of the value of this activity in terms of 'efficiency' or 'effectiveness', but it tended to be seen as highly beneficial, justified as a rational and cost saving activity, though little conscious analysis of this was undertaken.

The work with these forms of data showed increasing pressure on workload, and constant change. Diane described the need to be highly innovative with the base information provided by these applications. Further, these applications were to be re-developed under SAP, and therefore there was little investment in central development of GOMIS. Diane therefore was a 'stop-gap'. Further there was the issue of a certain amount of re-keying and/or re-jigging of the essential data in order that such new types of analysis could be applied. It resulted in integrity problems which were spotted in a rather ad hoc fashion. Some of the data would be uploaded after analysis, and the data would be verified by comparing a number of reports - a sort of data integrity check *after* the event. Whilst there were in fact few such discrepancies, due to the thoroughness of the team, when this did occur, obviously the utilisation of this data for information purposes would not be valid, reducing the general validity of the process itself. The whole process was painstaking and time consuming and was to be subsumed into the new SAP application. A clear case of innovation, albeit with some key information management faults, which was to be taken by the central data team as a feature of the new system (as promised). Yet there was a certain cynicism regarding whether or not the new SAP system would deliver as promised, and whether or not it would be a long time in coming. The SAP project was predicted to last two years in total.

...yes it is promised, but who knows when it will appear...

Researcher: *Is it a chore?*

Its a pain...but we'll have to do it forever.

There was no questioning of the validity of doing the activity (realism), or indeed how it was done. However, it also showed a certain frustration (frustrated realism).

Another example of the 'stop-gap' roles was in the jobbing function of the IMS. The application was about five years old, but already showing signs of its age, where final reports would be handled by a software package called Monarch to download data into end-user applications. The data would then be used to work out additional costings. So for example, if Betterflow (a subsidiary of Oxygen Supplies) sold more cylinders than expected, then the new costings would have to be calculated and subsequently uploaded back onto the project tracking database. It showed poor quality in the original design of the project tracking system, but also showed the end-user working in rather ad-hoc application areas in order to cope with changing circumstances. Certainly there was added value identified by the interviewees, and the poverty of existing applications were not particularly well identified by interviewees.

....its just one of those things that we need to do.

It certainly made data more meaningful. One additional point here was the poor level of integration between applications. For example, due to changes in cost centres the central application produced cost codes which were out of date. Thus the cost codes needed to be integrated and cross referenced with new cost codes and associated centres. One application developed on Visual Basic was to link a cost code with new cost centre codes. This type of application showed a certain ad-hoc characteristic - the user acted to fill in shortfalls when unexpected events took place. There was therefore evidence of the need to make information more meaningful applied to new circumstances. Users use of varied software was not to enhance information primarily, but to do smaller *ad-hoc* corrections

Sometimes were found to be discrepancies and the manual records are sometimes referred to (problems of data integrity). If discrepancies are spotted, then the manual records are sent (on film) from the Manchester office.

DOUBTER

All the initial interviewees came from the same section or were strongly associated with it, but were doing quite different jobs, with differing levels of status. The interviewees (above) were fully trained CIMA professionals. The link to being CIMA trained and the category of 'realist' is not provable or generalisable, and as will be seen is not of concern here. The realist

category was derived by the notion that the applications of technology were 'correct' and right, which fitted a unitarist vision of organisation. Such goals were seen as 'common sense' and 'correct'. Yet some other interviewees had a slightly more cynical approach. Simon was not yet fully trained, though had passed his level three (out of four) examinations. The fact that he was not yet qualified was a niggling inconvenience to Simon.

Its time really.... Now I have a baby, its almost impossible to study.... I'll get round to it one day.

This theme was followed up over a lunch in a pub in a rather informal setting.

Well you've got to be qualified nowadays. Especially if you want to get on....

Researcher: *Has it been useful to study?*

Yes, I've learned quite a lot. Well, there is such a lot to know.

Researcher: *Have you enjoyed studying.*

Yes and no. I just know I've got to do it.

Researcher: *Will it help you get on in the company?*

Well, it might help, but as far as I can see there are cuts left right and centre. I can't see me being able to pick up a promotion as a result of getting my exams. No you've got to be in the right place at the right time to do that, and do something special.... maybe it'll help me get out [of the company].

Researcher: *Do you enjoy your job?*

Sometimes. Yes I think so. Its OK really... I find it quite relaxing really... I used to find it a bit of a pain, but now we've got the baby, to be perfectly honest its nice to get out of the house. I don't live very far, and so I get up early, and get in for 7.30. I can then get away for 4.00.

This conversation occurred after an initial interview, and revealed a less than enthusiastic attitude to work. The realist attitude above was apparent in the conversations with Simon, but there was a certain cynicism also.

What I was trying to do was to link to our main suppliers. If I can get them to insert all the invoices into a single file, they can then give me a disk with all the necessary invoices on, and then we can pay them in one go. It means that we don't need to deal with individual invoices, just one big one a month. If I can get it right, I can check the individual invoices on computer instead of matching them up on paper one at a time...

Researcher: *Do your line managers know about this?*

Yes. Well Gordon knows about it. He thinks its a good idea I think.

Researcher: *How has he helped you?*

Well going on the course I guess.

Researcher: *Has he helped you other than that?*

Its at the early stage really. Just an idea. It'll save me a lot of time, so I suppose Gordon sees it as a time saver.... He's not really got the time because he's so busy with the SAP implementation.

Researcher: *Have you talked with your supplier?*

Yes. Well the main ones.... I was suggesting developing this model for the main tyre supplier... first. Distribution is a key part of our business, and so we get through lots of them [tyres], and we generally use... [one main supplier] ...for tyres. They said that they would be able to do it. I guess it would save them time too....

Researcher: *Why use a disk? Have you not thought about downloading the data down telephone connections or internet?*

No. I know we have got internet connections now. But I have never used it. We're a bit backwards here. We've only just got internal e-mail. I believe its on its way....

Researcher: *It seems a reasonable goal to me, but how did you think it up?*

We do so many invoices. Look at this lot [a pile of about 30 invoices to be paid]. I've got to reconcile them

and authorise payment. I need to do these today. It'll save me loads of time if we can computerise it at that end [supplier end]. Then, once its on disk, I can upload it straight into SAP.

Researcher: *What is stopping you do it?*

Time really. I have produced a simple version of it - its not quite right yet, but its not far off. I just need some time to sit down with it... But of course, its been sitting here for a couple of months now, and I've not been able to finish it. I need a look-up table type data base..... I'm not sure how I can do it...

Researcher: *What about taking some time off to do it?*

I cannot get my work done as it is They [management] would not give me time off to finish it...Well I suppose it would help my job, but not anybody else's.

Researcher : *Do you think 'they' [management] are being a bit short sighted on this?*

Maybe. I suppose everyone is too busy. I've got to drive it I think. Once I've done it, they will give me credit for doing it. Well ... another string to the bow I suppose. You've got to try haven't you.....no, not that that will make much difference in the end..... [referring to his career prospects]

The above conversation revealed a number of things. Firstly Simon's obvious cynicism regarding 'management'. Yet he was a manager albeit a junior manager. Yet he certainly did not integrate into his categorisation of 'them'; this was not a strong cynicism, but more an apathy for management, and mild annoyance at his own perceived lack of opportunity in his career. Secondly, his perception that the workload allowed little space for what he perceived to be valuable. His application of technology was deemed to be valuable, but was not seen as such by the management. In fact, Simon saw this a contribution to making his own life easier, and a major cost saving to the wider organisation. Yet there was a certain doubt in Simon's mind regarding the support of his seniors.

... they would not recognise it [referring to 'something good'] if they fell over it.

Yet Simon also 'doubted' his own ability to convince his seniors on its value, or even recognise his own initiatives as valuable.

A further example of 'doubter' was the case of Lester. He was beyond the age of expecting career development. Yet his application - which was to hold different types of marketing data - was seen as 'his own' in the face of a poor organisation around him. His was a very much more cynical and scathing view than that of Simon, but his was in fact a well intentioned application which used a combination of Microsoft Access and Microsoft Excel. The interview with Lester was interrupted at an early stage due to lunch time. This was quite revealing in itself, in that lunch was strictly adhered to in terms of time. Thus the first interview was undertaken primarily over lunch.

Researcher: *What made you hold all those details on customers?*

Lester: *Well it was a case of having to sort out the chaff really.*

Researcher: *What do you mean by 'chaff'?*

Lester: *Well, you know. All the crap that goes on in that place. We do not have the important stuff... the stuff that actually sells...*

Researcher: *Crap?*

Lester: *Management crap.*

Researcher: *You put together this database because you did not trust the other databases?*

Lester: *Its not that I do not trust it.... The buggers just don't have the sense to hold the stuff. I need it because we need to know more about the expanding bits of our businesses. Its the expanding bits that I'm concerned about. Any you know what that is don't you?*

Researcher: *No.*

Lester: *You don't?*

Researcher: *Well...*

Lester: *Health gases. We've got to expand this stuff. I hold data on the key people in the new Trusts. I hold*

the contact names, but not just that - I know a bit about their wives and kids, where they are going on holiday and all the personal stuff. I also know what they are buying, what they are in charge of and so on...what we negotiated last time and all that. [Pause]... To be quite honest, they are a bunch of wankers at this place. They make you think they know what they are doing. They see only profit and loss accounts, and ledgers.... They don't think of the important stuff like selling the damn stuff.....

Researcher: *You have set up a database full of personal information on your personal contacts?*

Lester: *Yes. And a whole lot of other things. I keep track of all the conversations that I have with my contacts.*

Researcher: *Is it registered with the Data Protection people?*

Lester: *No. I know it should be.*

Researcher: *Do you type in these details?*

Lester: *.....mostly when I'm on the phone....*

Researcher: *Did you get help setting up this database?*

Lester: *Yes. I went on a course about five years ago. It gave me a basic introduction to CardBox. That was the start of it, but I've taught myself since then. Now I use Access.*

Researcher: *Why did you move from Cardbox?*

Lester: *I was told that Access was to be the company standard. Cardbox was no longer supported. It was a case of having to... well I guess Cardbox was getting a little long in the tooth....*

Researcher: *Did you find it hard to use?*

Lester: *Yes.... I still prefer Cardbox.....*

Researcher: *So you are self taught on Access?*

Lester: *Sort of. There was a guy in the office at the time who was pretty hot on Access, and he helped me set up the new database.*

Researcher: *Why have it on a database - why not have paper records?*

Lester: *Sometimes I wonder that. On Cardbox it seemed a lot easier. Now its more tricky.... Access seems to complicate things....*

Lester applied Access as a series of flat file databases which contained 'contact' data. He went on to justify his application in that he could search the database whilst on the phone. It was obvious an awkward database application, and was not integrated into other applications: an unofficial customer/contact database application, perhaps making sense on Cardbox - with its ability to search on virtually any key word. Interestingly, his perception was that the promises of new technology meant that he also necessarily had to move on. The application was seen to be much more difficult on Access (probably due to the nature of its indexing which was field based in common with most relational databases) and the added complexity and power of multiple tables (which was not used in this case).

Researcher: *Have you looked into a package to hold such data - rather than this that you have built yourself?*

Lester: *There isn't one - well as far as I'm aware..... I'd never be able to get hold of a package anyway. The buggers would not give me the cash I don't suppose....*

Lester's application seemed to be on the face of it a highly dubious use of the technology. He doubted the use of technology, but had brought over the application from a much more simple database. His 'doubting' orientation was in that he did not see the validity of some of the information that was being held officially, and felt it had to be further 'enhanced'. He in fact wanted the application to be re-written, to allow quicker access to data and easier insertion. In fact he revealed that he was not using it as he used to.

Its more a keeping contacts on file nowadays - it used to be a great little marketing tool.

Lester 'doubted' the formal procedures of the 'official' data that was held, but also was

dubious of his own application at the time. His vision was as a result of a certain frustration with existing data, and viewed his past (and future) application as being more relevant to his own task of being at the front line in Sales (he had been seconded from Sales into the Accounting Services section due to the pressure on staff as a result of the SAP implementation). He demonstrated a certain frustrated attitude towards existing data which he saw as not serving his purpose. This frustrated attitude was a relatively mild frustration; but he was cynical of the competence of the existing people in providing appropriate data. He was a doubter of many routines, and even doubted his own application: yet did not doubt his *vision* of the new application.

Anthony also displayed key characteristics of the 'doubter'. He was cynical about much of the common practice of other parts of the organisation - as if to say that it is rather misdirected, reactionary and lacking in vision. His application was seen as something that had to be done; unlike Simon or Lester, Anthony was told to develop the application. This was one of three where a PC was used to download data from the central technology applications (called GOMIS, SAR and the new SAP applications). A product called Monarch was used to format the data (in ASCII) before it being imported into an Access database, sorted into branches within 8 areas of the country, new key codes were created from the existing ones (by truncating the existing codes, having extracted the ones which were identified as needed, and these were put into separate fields); some calculations were also made (and inserted into new fields!). The formatting was complex, and data summarised into a number of different spreadsheets which served different purposes.

Well I inherited some of this stuff, and have added to it a bit.

Researcher: *It seems enormously complex. What is the data used for?*

Well a whole number of things really..... [detail]

Researcher: *Why don't you do some more of the work on the mainframe*

I don't really know. I have developed this because we needed it and its already there.... I suppose we keep adding to it...

Researcher: *Have you talked with the IS section to see if some more of it might be done on the mainframe?*

No. I think what people want changes too much. People never make their minds up. I have to keep changing the system [application].... Sometimes I doubt if its the right thing to do, but we still do it.... we live from day to day in this place.... nobody knows what we're doing...

Researcher: *Has anybody ever thought through the best way of doing all this?*

No. We just keep adapting it.... we never think about it God no!

Researcher: *What help have the IS section given to you?*

*They are a bunch of useless b****ds. I'm sure that we have more expertise in here than that lot. Besides they are all tied up with SAP at the moment.*

To Anthony there was a lot that was wrong in the organisation - not least the Information Systems section, but others also. He seemed to doubt the validity of his application but saw it as a practical way of achieving a varied set of things when they were needed by himself or by somebody else. He was most certainly a doubter, dubious of a whole range of operational issues, but unable or unwilling to try and think through alternative approaches, that might make further impact.

DEFENDER

A further aspect or dimension to the category of 'doubter' was in the case of Dave². He was much more concerned with proving his value to the organisation, and using the technology to demonstrate that value. Yet in conversations, those were his covert motivations, and analysis on his use of technology revealed a certain defensiveness in his actions. Indeed, in the second (of two) interviews, his opinions were rather akin to propaganda. Thus from conversations with Dave², a new category of 'defender' was created, where the best explanation of technology application was to 'defend' his/her corner. This was a category which emerged from the 'doubter' category because on reflection, there were some distinct differences in the phenomenological world of Dave² from that of others. In fact, on initial interview, it was difficult to differentiate between 'doubter' and 'defender' because both these categories displayed a sentiment of 'apathy' towards existing procedures, method of work

and the 'official'. However, the difference was in the aggressive nature of the language used, and in the application of technology towards ensuring indispensability sometimes (though not always), shrouded in language which made it seem 'correct' and 'right'. Yet as can be seen from the two separate interviews, this 'correctness' was to ensure nobody else was let into the application: nobody else was able to understand the area of work to which the application was being applied. And yet, there was something more sinister than that of 'doubter': whilst the accounts of the 'doubters' seemed to display an attempt at an honourable 'contribution', to what was seen as a rather failing context, Dave²'s account could not be seen as a genuine attempt at a contribution to the wider good. These are conversations taken from a the first interview with Dave². It was deemed that a second interview should take place, because of the need to put Dave² into the new category of 'defender'. Initially Dave² was the only 'defender', though in later interviews, two further users were put into this category. His was an application which helped schedule plant maintenance and associated costings. The sentence that sparked the idea of 'defender' was this:

Nobody really knows what I do..... nobody knows about this [application].... There are a few problems with it, but it works pretty well... but I want to develop it further and I want your advice....

Researcher: *Why not ask the IS section?*

Its nothing to do with them. They would tell me all sorts of crap, it would take a year, and nothing would be done.

Researcher: *Have you approached them?*

No. I've been here longer than any of them... and I know what its supposed to do. They have no idea....

Researcher: *What does this application do?*

It details all the maintenance that needs to be undertaken. The problem that I have is that nothing gets done unless its an H&S [health & Safety] issue. I want to make sure that everyone knows a piece of kit is down, and when. It means working a year in advance because otherwise it is always postponed. They [assume Production] always bugger me about, when I know there is maintenance to be done. What I want is for the system [application] to take production data, and re-schedule it around down times and then I can present

them with revised plans....

Researcher: *Have you consulted with the people in production about this?*

No point. They don't listen.

Researcher: *Are you suggesting that your application alter production plans?*

That's exactly what my job is.... I worked in production for nearly twenty years, and I know that there is very little planning anyway. Most of the stuff that we do [on the site] is routine stuff....

Researcher: *So you tell production what their planning will look like?*

If I tell them when maintenance is to be done, they just don't listen. I need to do everything for them, by altering a few things - shift patterns and the like. Its quite simple actually.... That way I'll get more chance of doing my job properly....

Researcher: *Are you sure that you can alter production planning without them knowing about it.*

I'm not shifting it, but suggesting changes to it. It makes life easier for them... don't you see? [Bit of frustration]

There needed a bit of backing off here. What he was suggesting sounded rather incredible, though his perception seemed to suggest it was quite easy. The ease of this was difficult to gauge. His model was (in principle) quite simple, with a set of dates, jobs to be done, down time (with associated costings) and an allocation of people to do the jobs - a project plan of sorts, which could be sorted on date, jobs and people. The questioning took on a slightly different look at the same issue.

Researcher: *Do production have your planning.*

Of course they do. I give them the plant maintenance plans as soon as I have worked them out. I give them reports form the system [application].

Researcher: *Do they know how you work them out?*

Yes. They know that certain jobs ... need doing periodically. Its my job to tell them and then make sure its done properly.

Researcher: *How does your application help you to come to the right maintenance plan?*

I sort them in different ways. There are different categories [a rating of importance with interval dates] which are sorted..., and I can work out who does what when and that kind of thing.

It was revealed by another interviewee that Dave² had been marginalised from the production section, and was rather unpopular. His proposed application of technology was to enhance his standing in some way. During the second interview, he revealed that

...if I tell the [production] guys ... speak to them you know ... they'll forget. If I put it on a memo, they'll file it. If it comes from a computer report with all the details, they'll take it more seriously, but they still find excuses. If I can make them see when there are changes needed [to the long term production schedules] they have no more excuses left

Researcher: *Have production seen your application.*

No. They know that it comes out of the computer, but they have not seen how its done.

... they would not be interested anyway. They would not understand it because they do not know about the kit that we use. Its big stuff here, and its complicated. I've been here longer than anybody else, and that's why I am put in charge of maintenance....

Dave²'s phenomenological world was one of direct confrontation. It was his policy to enhance his own importance and impose that importance on others. His application served that purpose, though there was obvious benefit in organising the schedules on computer.

Having thought through the validity of having a category of 'defender', in two later interviews, there was further evidence of this type of motivation behind the applications. Dave¹ and Julie had been working together on downloading data from the GOMIS system, formatting by using a product called Monarch, and then re-formatting it. Each had different applications, with some similarity, which was justified by the fact that the data needed

considerable re-formatting and development.

The users at Oxygen Supplies generally used the technology in a limited way, focusing on immediate problems. This was limited in that the powerful tools that they used generally were not integrated into a wider or more 'holistic' information management analysis. The users themselves were not particularly questioning of their own assumptions or motivations. Thus their perceptions were somewhat limited and it seems that information management was a key issue for widening horizons. Whilst a key element of this is on technological skill, there are issues over information evaluation, priorities as well as issues of integrity and integration. Yet they showed innovation with information and with a reflective guiding hand, can indeed be a useful source of innovation, but this must be complimented by a learning agenda - not just about technology, but also about information. The other issue, which is most important to emphasise is that these users cannot be seen as somehow substituting for professional systems development work, but can be seen as innovating with ideas and approaches at the information level, and can produce, as has been seen, useful prototypes and ideas given the time, space and support. Whilst these users tend to focus on a narrow view of their work, these can also hit upon areas which in fact require larger change in organisational work and method. Generally speaking, and potentially a result of stand-alone PC work, these optimise only at the level of the individual task, and usually there is little support given, or indeed little credence to the wider impact on the organisation. Despite lip service being paid to the issues of empowerment, the user seems to be fighting both the technology and social infrastructural assumptions. Structure and power of organisational context seemed to be determined some aspects of technology utilisation. Whilst attention has been paid to the technical aspects in the past, these need to be complimented with wider information - and therefore social aspects - such as empowerment and learning, if the potential of the technology is to be genuinely tapped. Indeed, it might be argued that the technological focus has resulted in overlooking those other factors which need to be addressed in order that we can take seriously this element of the 'bottom-up' strategy of the work of Earl (1989). Yet of particular importance in management of this area, is that of being sensitive of the demands being placed, and key motivations of this type of work and associated roles. Indeed, this type of analysis could not be complete without looking at the wider social power relationships which can, as it has been argued, determine - or constrain - the phenomenological world of the subject(s).

THE DEVELOPMENT OF CASE FEATURES

The second phase of the research was an attempt to attempt an investigation of the influences of the various groups, and thus move to a further level of analysis on the behavioural issues in end-user application developments. The main focus of the first set of interviews was to elucidate various 'features' and thereby provide a sort of taxonomy by analysing attitudes. The second phase was concerned with moving from a description to the development and testing of 'grounded' theoretical explanations (Glaser & Strauss 1967) of the '*pertinent social phenomena*' - ie the four differing attitudes or orientations. Thus the second level of analysis, a provisional list of phenomena under which particular attitudes or orientations are pronounced or minimised (see Glaser & Strauss 1967, pp. 106). Thus through a second round of interviews, it was possible to compare orientation categories and to identify which case features were useful to a category and which were shared by two or more. Thus the second phase involved the 'funnelling' (Hammersley & Atkinson 1983, pp. 175) or '*progressive focusing*' through a shift from the primary concern with description. In some ways this was what Becker (1970) has termed the stage explaining " ... *particular social facts by explicit reference to their involvement in a complex of inter-connected variables that the observer constructs as a theoretical model Which best explains the data ... assembled.*"

The first round interviews were analysed again using the tapes to develop a construct, much like a content analysis for *all* the interviewees. The above dialogues represents those that enabled the categories to be developed. The purpose of this was to construct a matrix, which allowed the researcher to ensure that all such people could be inserted into the four categories based on the applications that they had articulated. In some cases there was more than one application. As already mentioned the category of 'opportunistic' had been dropped, because it did not make reference to a single application. It was more associated with respondents opening up doors.

The development of the following content analysis served the function of exploring which other categories could be or should be developed, which focused on the motivations of the technology applications that were developed/applied. It also allowed the researcher to 'categorise' the conversations, which helped put each individual into one of the three categories.

Person/category	Realist	Frustrated Realist	Doubter	Defender
Simon			1	
Martin	1			
Jane	1			
Keith		1		
Isobel		1		
Dave ¹				1
Kay	1			
Sean	1			
Iain		1		
John	1			
Lester			1	
Anthony			1	
Sarah	1			
Phil		1		
Dave ²				1
Jimmy	1			
Julie				1
Total	7	4	3	3

TABLE J.1: A SUMMARY OF ACCOUNTS WHICH FELL INTO ONE OF THE FOUR ORIENTATIONS. ('OPPORTUNISTS' OMITTED)

Before developing on further data analysis, it is worth hypothesising on attitudes and orientations so far developed. It seems that the imagery embedded language used in the above interviews suggest that there was a definite feeling of 'them and us' in the accounts of the 'frustrated realist', 'doubter' and 'defender'. This is quite different in each case. Firstly, the 'frustrated realist' showed an unwillingness to accept the formal information systems as providing the best way to handle all the data; it was seen as an impossibility, and only by further analysis - using technology as a tool - could suitable information be created. There was a certain distrust of the formal systems, though they were often used. In the case of 'doubter' and 'defender' there was much more apathy or distrust of the organisation, and its imposition of control over individual human activities. All described themselves as middle ranking managers, though it was obvious that many were quite junior, and their roles were more akin to senior clerks. Some had been involved in the SAP implementation, but most had not. All saw themselves as members of some sort of professional body. Some were qualified as such, and others not. However, it was not seen as important to cross tabulate these at this stage, because such quantitative work was not likely to reveal significant explanation for the different orientations: this would be akin to over use of Ockham's razor -

ie the principle that there is danger in devising more explanation than is necessary in any one situational context. Following Bloor's (1976, 1978) modified version of Analytic Induction, it was decided that further analysis would derive from the application of more substantive theory akin to Glaser & Strauss's 'constant comparative method': to use theory to 'sensitise' or to seek '*direction along which to look*' Blumer (1954) p.7. There followed an evaluation of social literature. Two of the above categorisations led to some simple guidance in the search for more substantive social theory. Firstly, it was the category of 'defender' which suggested that of Labour Process Theory; and the 'frustrated realist' focused the mind on Structuration Theory. The two are incorporated into the theoretical constructions in the following chapter.

ⁱ In order to protect confidences, a *nom de plume* is used.

CHAPTER 6

OPERATIONALISING STRUCTURATION

...being-in-the-world involves not 'subjects' but situated human beings absorbed in routine (or pre-reflexive) practices or activities with not objects but Zeuge (tools, 'gear', equipment) and involved in shared meanings and practices with not 'subjects' but other finite human beings. It is only with breakdown of human activity that humans become subjects and Zeuge become objects...

Scott Lash, 1994, p. 151

INTRODUCTION

The previous chapter focused on the 'orientations' that professional information user/consumers have expressed in their technology applications. This chapter takes this a stage further, by utilising other theoretical concepts in order to guide the research. In accordance with the adapted analytic inductive approach of Bloor(1976), this chapter deals with the latter two stages: i. to develop the case using a theoretical construct, and ii. to test the observations by using a separate case. This chapter achieves this by discussing the application of Structuration Theory (Kawalek 1997b).

It had become apparent that managerial roles and associated power allegiances play a particularly important role in their propensity towards the technology, termed 'orientations' as described in the previous chapter. It also became obvious during the interviews that some of the formal elements in an information strategy could be 'informed' by some of the informal innovations by end-users. Yet such opportunities tended to be missed by the information strategy. Also, the information strategy seemed to miss the need to include the informal components and this resulted in, the end-users being poorly supported at the information level: the hardware and software components were supported, but there was also the need to be more reflective (on the part of the user and Information Systems specialist support staff) of their own motivations and reasons for the application of

technology in the way that they had applied it. The way the technology was applied were reactions to a wide variety of events and issues, and were 'rationalised' and 'justified' as being in the organisational interest. In many cases, this would be a dubious assertion. No one 'orientation' was 'the best': each had demonstrated a 'rationality' in some set of objectives, but each had some problems in meeting a set of objectives, and certainly could not be necessarily fitting a single 'organisational' objective or a consensus on how to achieve such objectives. Fundamentally perhaps, some of the limitations of the perceived information needs of the end-users could be explained by the formal 'structure' as a way to sanction power, as well as informal perceptions of power (or lack of it).

At this stage, substantial 'sensitising' was undertaken by focusing on Giddens's (1984) Structuration Theory, and Braverman's (1974) theories on the Labour Process, to identify their explanatory utility of the different 'orientations'.

It was logical to seek how structural and behavioural analysis could be informed by the use of some of the social literature. This was to help inform the next stage of empirical work. Yet this proved a difficult (though interesting and fruitful) task, not least because of the complexity of the area, and a relative unfamiliarity (on the part of the author) with some of the sociological literature. Yet the direction towards the sociological literature was to some degree influenced by the fact that there has been a certain interest in recent years regarding the alignment of information systems with social theory. Indeed, Systems thinking as a dominant underpinning philosophy for the discipline of Information Systems has already embraced the hermeneutic tradition in social theory. Cybernetics, applied in to human activity, might be compared to a structuralist perspective in Social Theory: it commonly uses cognitive analogies and metaphors derived from biology (eg 'organisms') and thereby deriving 'structures' which emphasise the pre-eminence of the whole over its individual parts. Soft Systems approaches (Checkland, 1981, 1990) has been innovative in shifting such the ontologically and epistemological realist approaches away from its natural scientific roots, attempting better alignment with interpretive sociology and hermeneutics. The dominant epistemic assumptions of such an approach has been to analyse the 'Weltansshauung' of key 'subjects', which takes the 'boundaries' of those subjects as conceptually created by the subject. This is more akin to the behaviouralist (as opposed to the structuralist) school in sociology. It is not to over simplify however: systems 'boundaries' are not the same as 'structure' in the sociological sense: 'boundaries' in soft systems thinking is a conceptual device in order that further analysis can take place. Structure in social theory, describes social

structure and associated power dimensions.

Yet the fact that systems thinking embraces the 'subjectivism' in investigating the Weltanschauungen of the subjects (or 'actors'), suggests that there may be opportunities to explore how it might be informed by the behaviouralist school in sociology (or vice versa). Thus, it is not surprising to see social theory referenced in the Information Systems literature. There has been a great deal of interest in Structuration Theory as a sociologically based underpinning for some areas of Information Systems. Structuration theory (Giddens 1984) is based on the dichotomy between structuralist perspectives which emphasise the bureaucratic and *formal* aspects of human society (Riley 1983), and the interactionist approach which focuses on the informal structures and dimensions arising from human action (behaviour). The alignment between the structuralist school and that of the 'informal' and behavioural tradition in sociology often derives its methods from the hermeneutic tradition, where 'subjectivity' (ie epistemological 'boundaries' or 'structures' are conceptually created by the subject) is the norm. Structuration is seen as bridging the two schools of thought in sociology in much the same way as Soft Systems thinking has acted as a bridge between the concept of Systems being used as a natural science, and that of the hermeneutic social sciences.

Structuration theory has also been playing a key role in management literature and is related to much of the 'Agency' and 'strategic choice' thinking (Reed 1988; Armstrong 1991). However, the influence of the key themes within the theory proposed and developed by Giddens are not easily summarised (Cohen 1989; Craib 1992). The first part of this chapter attempts to interpret these key themes from the huge output of Giddens, focusing particularly on the issue of Agency. This is because the concept of Agency focuses on the patterns and constraints for action which have a strong influence on the behaviours of individuals in any one context. This was hoped that by doing this, greater understanding would ensue to enable the utilisation of Structuration in explaining some elements of the behaviours of the individuals in each of the 'orientations' as described in the previous chapter. Part two is a synopsis of the problems encountered in applying some of the themes in Structuration. It starts with an analysis of how the work of Giddens has impacted on the management literature and how the central concept of Structuration has been used. This enables an analysis of the assumptions and approaches of contemporary Information Systems writers. The articulation of some of the themes developed in the literature have been taken as part of the 'sensitisation' process which is part of the analytical inductive method

(Bloor 1978).

Thus a synopsis of the second set of interviews then follow in part three of the chapter, and the impact of the interpretation of Structuration is evaluated, in enabling the development of the case study research. One of the themes in developing this analysis is the role the end-user has in the 'formalisation' of certain routines: in other words, some user applications become assumed in the information strategy of the organisation, which are based on the power of user groupings. Two particular applications are singled out for further analysis. This is done in part four of the chapter. Some conclusions for the discipline of Information Systems are developed in part five of the chapter, and are further developed in the concluding chapter of the thesis.

1. A REVIEW OF STRUCTURATION

The outputs of Giddens, spanning over a twenty five year period, have been extensive (Giddens 1971, 1973, 1974, 1976, 1977, 1979, 1981, 1982, 1984, 1985a, 1985b, 1990, 1991, 1994). This section provides a brief critical review which is seen as a necessary precursor to subsequent debate around the way Structuration is operationalised in key managerial literature (including Information Systems), and for the purposes of development of the current empirical work (Macintosh and Scapens 1990). The central theory of Structuration and issues of Agency within the theory is a primary focus where notions of class and state are also noted. These were important points in the development of the application of Structuration because of the 'orientations' presented in the previous chapter.

STRUCTURATION AND 'AGENCY'

The emphasis on knowledge and reflexivity is central to the argument that organisations can be moved in some coherent and explicit direction which enables a *deliberate* and *effective* strategy (see also Mintzberg, 1990, 1994a, 1994b). In fact the position resists a post-modernity pessimism over human action for achievement of particular ends (Giddens 1990). However, control in organisations is going to be far from complete resulting from the inter and intra organisation diversity (Giddens 1985a, p. 186). The structure portrayed in Giddens's work is 'multidimensional' (Giddens 1990, p.12), in which capitalist production is a complex and ephemeral cohesion where key social issues such as ethnicity, gender, knowledge, 'expertise',

as well as institutional forces - not least the State - play a key conflicting role to generate structure. Such key issues are the central tenets within which the opportunity presented from human Agency is determined. Thus, Structuration is based primarily on the forces of such Agency and interaction with social structure (Giddens 1984). Further, social structure is itself guided by the wider socio-economic system (Giddens 1984 p. 256 - 262), in which human agents are both enabled and constrained. Rules such as sets of procedures, techniques and norms are subject to this type of enable-constraining dichotomy. Other dimensions such as resource allocation, 'empowerment' - or power, guides everyday action, and are also key aspects which can be subjected to this form of analysis.

The structural aspects exercise a certain domination at any one point in time where an individual faces a set of structures that are not easily influenced by what he/she does. Indeed, individuals tend to conform to uniform patterns of behaviours that reflect and reproduce the structures (Giddens 1984, p. 60-68). The concept of 'system' is introduced into the theory in order to generate an interdependent duality and thus social systems are in some ways constrained as well as being constituted by the human agent. This is a rather different conception of 'system' from that in mainstream Systems Theory: it refers to the constraining nature of the 'system' on action. The term 'system' here is to enable an analysis of social structure which 'dictates' or 'constrains' human action within context. (Of course this might be included in Soft Systems Methodology (Checkland 1990) as part of the exploration of the Weltanschauungen of subjects, expressed in the social or political analyses. However, it is a narrow view of the meaning of the word 'system'). This is a key epistemological point which will be explored: where does the 'structure' come from: is it in the phenomenological world of the subject, or otherwise? Whatever their source (in an epistemological sense) in Structuration, the structures collectively define the rules, techniques, norms and behaviours, as shown in Figure 6.1.

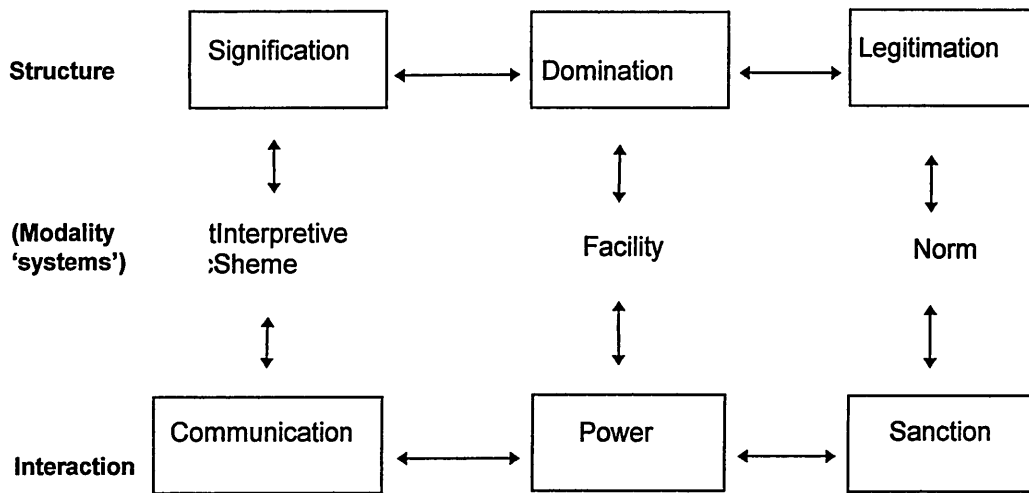


FIGURE 6.1: THE MODEL OF STRUCTURATION (AFTER GIDDENS 1984, P. 29)

The belief in Agency, where human beings in social situations *can affect* the social norms and structures is where Giddens perhaps departs from some of the common Postmodern writers. Structural forms do not prescriptively determine action, but often act as a *guide* to action and, over time are created by that action. This basic approach has been applied to organisations (which are seen by Giddens as 'collective agents'). Whilst this issue of Agency remains the subject of some debate, Giddens provides a theoretical scheme with the potential of being applied to many contexts at an organisation and societal level. Figure 6.1, for example, illustrates the informal aspects of everyday communication, power and sanction for action as key factors in utilising Structuration theory. These are derived from human indexicality and reflexivity of any given social environment where societal experience is significant and *not confined only to the norms and procedures of the internal organisation*.

By focusing on Structuration in this manner it is possible to reconcile Giddens' other work. For example, that social class is a source of domination, and affects the interpretive scheme of the individual in any social situation. This shifts the interpretation of Giddens towards a reconciliation with some of the wider and perhaps more Critical elements of social philosophy. This type of analysis has not been seriously attempted in the management literature and more importantly (to the current work) those associated within the discipline of Information Systems. Yet it also presents a number of problems, as are articulated in

section 2 of the current chapter.

Further, as previously noted, for individuals in society, Giddens insists that they have the ability to choose. In this way Giddens resists the 'deterministic' aspects of other social writers including the (more pessimistic) Postmodern philosophers. In other words, the philosophy of Giddens argues for Agency where humans ultimately have an *element* of control. Giddens expresses the decisions that can be made as '*strategic life planning*' (Giddens 1991) which also exists at the level of the organisation. Giddens' broader theoretical writing also allows for the possibility of Agency built upon norms of behaviour and forms of authority. Agency is thus *independent* of strict capital logics (Giddens 1981 p. 138, 221; 1984, p. 205; 1985a, p. 134) which is enabled by contextual complexity within time and space. Consequently, there is the possibility of Agency given the multi-dimensionality of modern society which brings together interests of capitalist competition. These may be combined with issues of class, ethnicity and associated values which dictate action in any given social setting. Thus, it is not a monolithic position which determines human action but the recognition that '*...human beings as knowledgeable agents, reflexively monitoring the flow of interaction with one another*' (Giddens 1984, p. 30). However, this view of Agency, which assumes there are norms and routines that enable '*...ontological security*'; this reflects the structural forms in the context in which they are placed. It has been said however, that this position ignores human beings for their creative potential to manage their own situation (Willmott, 1986a). This is perhaps where Giddens differs fundamentally with some of the traditions of the 'radical' humanist philosophies. However, it is not to say that Giddens belongs in any one quadrant of the Burrell & Morgan (1979) model. In fact, there are two differing approaches that have been taken in the management literature which reflect a certain ambiguity. Before exploring this, it is worthwhile exploring Giddens's perspectives on perspectives normally associated with the 'radical' theories in sociology.

CLASS AND STATE

Structuration Theory (Giddens, 1984) is a construct which has its roots in neo-marxist notions of social class and divisions of labour. The theory is innovative in that it attempts to produce a generalisable construct which also encompasses a level of analysis of the behaviour of social groupings. Thus it has been seen as a useful construct in which to explore the diversity of action that 'constrain' action (as depicted in end-user orientations applications of technology). Structuration theory itself acknowledges core social structure as a basis for

analysis where interactional sequences play a key role in producing that structure. Associated with this is the concept of power within the social class of the subjects (Giddens, 1973 p. 104, p. 171; Stanworth & Giddens 1974). Thus, to enable a fuller understanding of Structuration theory these issues require further consideration.

However, such a consideration should not necessarily be monolithic where such an analysis plays a *deterministic* role as in these circumstances the freedom of reflexive Agency is lost. As already mentioned, this is derived from the reflexivity and indexicality of that human agent. In operationalising Giddens it is important to justify assertions regarding the role of interpretations of action and the meaning attributed by key actors (reflexivity). It is also important to see how that individual makes sense of particular events (indexicality). In the theory, this should be simultaneously constrained by and inform structural components. It is, however, also a denial of its roots in Marxist historicism to ignore the domination of structural forms epitomised by factors such as social class, ethnicity, gender and the state. Indeed, it is the central notion of the State (and associated power), which gives the field of modern management a window to analysing organisations. The State is a macro form of organisation. It has power - for example in the control of 'violence' (Giddens 1985a). The State is seen as a form of organisation, and therefore subject to the same analysis.

Consequently, Giddens's proposal that the state is a generic form of organisation (1985a, p. 18) enables us to operationalise his thinking within the field of Management. The state is "*...a collectivity in which knowledge about the conditions of system reproduction is reflexively used to influence, shape or modify that system reproduction.*". Thus, there is the obvious linkage between the work of Giddens and the operationalisation of *on-going* analysis of everyday action surrounding the utilisation of technology for information purposes. The discipline of Information Systems should seek alignment with such issues as they have a role to play in social power and domination, and therefore in issues of Agency and legitimation which is at the heart of Structuration theory itself. In doing this it is possible to enrich analysis of the *everyday* utilisation of technology (and thus of the information enabled by the technology), and thereby enable analysis of the everyday constraints that individuals face in trying to 'improve' a perceived problem situation.

2. PROBLEMS WITH STRUCTURATION

However, problem in operationalising Structuration Theory is where to start. Is it at a societal level: analysing class for instance and seeking explanation of action resulting from such an analysis. This is undoubtedly a societal 'structure' which is directly referenced in the work of Giddens. Yet this poses a set of problems. Does analysis of class start from socio-historical analysis; or does it start from the phenomenological world of the subject(s). On the one hand there is the obvious danger of imposing such a 'structure' on the analysis, which in fact has little meaning for the subject. Giddens seems to be ambiguous on this, and the ambiguity leads to a wide variety of analyses. The central notion that structure plays an important role in determining action is undisputed, but structure such as 'class structure' may or may not have meaning in the phenomenological world of subjects. In other words, structures can be seen as a construction by the subject, or it can be determined by socio-historical/ economic analyses. This is a most important question in guiding *epistemology* when utilising Structuration.

In discovering the theory of Structuration, it thus gave rise to investigating how Structuration has been used in wider management literature and in the context of technology utilisation (Garnsey 1990). In doing this further problems were uncovered. The following section focuses on the way Structuration has been used in such literature, and then details some of the resulting problems, with a particular focus on its use within the discipline of Information Systems.

OPERATIONALISATION OF STRUCTURATION IN MANAGEMENT LITERATURE

It is at the organisational level particularly that Giddens has contributed to the Management literature. Structuration theory has immediate relevance to management action where the assumptions about Agency remains of key importance. We need to consider the notion that change can be instigated by the powerful within the organisation and the extent to which they themselves are constrained by other factors ('constrained' here is used as opposed to 'determine' because of Giddens's own resistance to see human action as 'determined'). Furthermore, it is useful to develop the notion that it is at the everyday level of *the informal interactional sequence* which is central to shaping and changing the structural elements. By operationalising Giddens in this way the context is set to enable, therefore, an analysis of the Information Systems literature, that have utilised such concepts. There are, of course,

numerous debates regarding the formulation and interpretation of Giddens. In the wider management literature, for example, Willmott (1981, 1986a, 1986b, 1987) and Pettigrew (1985, 1987a, 1987b) in particular have utilised similar, but differing themes and approaches. Both of these writers have made assumptions and unique interpretations for operationalising Structuration Theory.

Yet one of most influential management literature, which urged the utilisation Structuration is found in Ranson *et al* (1980). Giddens (1976) is used primarily in this work rather than Giddens (1984) which is commonly accredited with Structuration. They stress that the structuring of organisations is the privilege of *only the powerful* who are able to shape the organisation for their own purposes. Whittington (1992) points out a denial of the reflexivity and indexicality of the human agent which primarily acts at the subconscious level. Agency is constrained by the physical (geographic), economic (market) and social (class, gender and ethnic) characteristics, but at the same time reacts to such contextual forces. The work of Ranson *et al* (1980) emphasises the internal organisational 'constraints' to Agency but does not align wider societal issues of conflict. In a rather similar vein, the longitudinal studies by Pettigrew (1985), focus on trends, triggers for action, pressures and impacts, primarily coming from *within* the organisation. The context of the analysis is focused on managerial action and Agency '.... by conceptualising structure and context not just as a barrier to action but as essentially involved in its production ...'. which are aspects of structure which are used to '... obtain outcomes important to them.' (Pettigrew, 1985, p. 453). Thus there are two significant concepts developed by Pettigrew. That of the 'inner' organisation politics and the 'outer' wider business and economic environment. These are less akin to structure and Structuration than they are to the traditions of organisation science: from 'structure' to 'context'. The 'outer' is somehow separated from the 'inner' and there is little analysis of ICI, from the case adopted, being constituted by the structural properties of *society* and sets of norms, beliefs, domination, power and 'defensive' action. The wider societal aspects of class, gender, ethnicity or others cited areas such as professionalism, managerial legitimacy or via 'expertise' are not developed, and yet play a pivotally important role in Structuration. In this type of analysis, there is emphasis on the personal competencies of the organisational managers rather than the evolving and changing nature of the broader societal context, as shown in Figure 6.2.

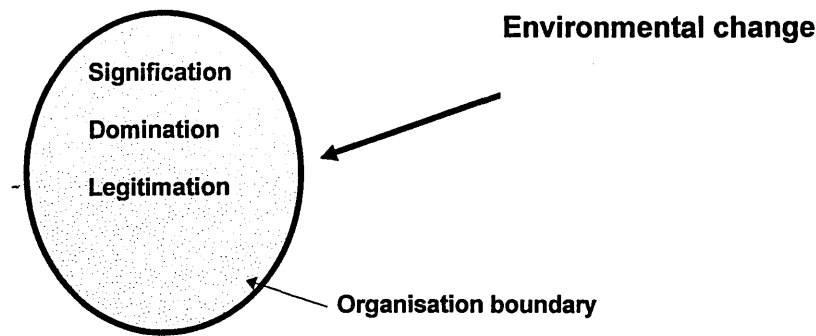


FIGURE 6.2: THE ORGANISATIONALLY 'BOUND' INTERPRETATION OF 'STRUCTURATION'

Of course this type of analysis has significant impact, but it also has some difficulties. Willmott (1987) on the other hand, pursues a stronger societal structural stance, aiming at reintroducing the 'institutional' into accounts of behaviours of managerial action by stressing the idea that managerial Agency is constrained by the wider capitalist constraints, and labour processes. Broader capitalist structures define authority within the firm though Agency is enabled by the imperfect acting of roles. This may be seen as a development on the classic work of Braverman (1974) whose accounts are grounded in everyday occurrences of being subjected to varied forms of power and domination, mainly explained by the level of skill (and therefore power) in the workplace. The requirements of capital may be compromised by managers who '*.. interpret and act out their 'functional roles' in the light of their own (minimally) autonomous cultural and ideological values*' (Willmott, 1987, p. 258). In writings such as Knights & Willmott (1987) and Willmott (1987, 1986b) structural rules, norms and resources (professional knowledge and legitimacy) succumb to capitalist logics which transcend the distinction between inter and outer organisation politics and social structures (see also Smith *et al* 1991). This places the analysis in a less socially ahistoric manner, conforming to the more traditional forms of historical materialism which is criticised by Giddens's rejection of some of the prescriptions of historical materialism (Giddens 1981). This is probably the issue where there is most philosophical division. On the one hand, Willmott (1987, 1986b) argues for recognising scope for managerial interpretation and action, emphasising capitalist forces

in determining action; on the other hand, under-emphasising human creativity in determining such structural forms, because structure is a human creation. This is a complex philosophical debate, but the point of this in terms of the current work is that it would be wrong to take an overly narrow perspective on the work of Giddens, and associate Structuration to the 'interpretive' quadrant of Burrell & Morgan (1979) : it has elements of 'radical humanism' also. Giddens's roots in Marxist philosophy cannot be denied, and analysing societal power and domination, otherwise the analysis may become typical of the English intellectual as "...snug ... complacent ... [and] ... tweedy" (Giddens 1976, p. 35).

".... The fact that the global economy is dominated by capitalistic mechanisms, and that the most influential agencies within it are capitalist states and transnational corporations, remains of fundamental importance to the nature of the world system as a whole." (Giddens 1981, pp. 339-40).

However, a key point is on the emphasis on the *powerful* as *sole champions of change* that is problematic in some of the assumptions of classical Information Systems directed change. Also it has impact on whether personal information strategies which are constrained by *both* internal and external organisational factors, not least social conflict and the need to protect and enhance power, or the subtle and seductive ideologies which are in the interests of one social grouping but not others (see Reinhardt 1994 on the 'ideology' of competition). In other words, structural form comes from wider social conflict, and analysis should not be confined to boundaries of the organisation. Thus, changes in legislation or new interest rates may have some effect, but taking the view of Ranson *et al* (1980) the organisation in most cases is seen as separated from society. Giddens' work on class (Giddens 1973, 1981) is largely ignored and the processes and power relationships around the maintenance of managerial elites is given scant attention (Stanworth & Giddens 1974). Thus, whilst Structuration Theory (the idea that everyday action informs structure) has been integrated well into the Management literature, the work on class, the state, ethnicity, gender, management elites, conflict and the breakup of cohesion in wider society has mainly been ignored. This is illustrated in Figure 6.3.

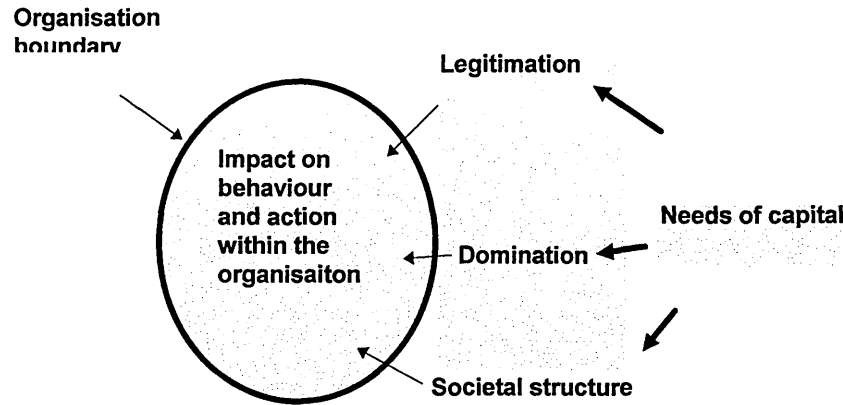


FIGURE 6.3: SOCIAL STRUCTURE AND THE ENVIRONMENT

STRUCTURATION AND THE DISCIPLINE OF INFORMATION SYSTEMS

Within the discipline of Information Systems, as Jayaratna (1994) points out, one key function is that of Strategy. As such Information Systems Strategy is often encapsulated within models such as McFarlan's Strategic Grid (McFarlan 1984), market sector analysis (Porter & Millar 1985), establishment and assessment of 'factors' that are critical to business success (Rockart 1979), 'era' or stage growth models (Nolan 1979; Ward *et al* 1990), process re-engineering (Hammer 1990, Hammer & Champy 1993, Davenport 1993, Davenport & Short 1990, Harrington 1991) and other associated constructs and derivations. Some interpretations of Information Systems strategy primarily conceptualise it as a set of models and 'rational' behaviours (Ward & Griffiths 1996, Edwards *et al* 1991, Currie 1995). These assume that the boundaries of strategy are determined as its 'function' in justifying, conceptualising and implementing a strategic vision for organisations, but not seeking explanation of the need for such strategies, in wider societal or economic trends. Such models do not see the reasons that certain strategies gain precedence or dominance over other. Others see Information Systems strategy as also a social process (Walsham 1993a, Zuboff 1988, 1994, Kling & Scacchi 1982, Boland 1985, Lee & Liebenau, 1996), and thus have the potential to develop a more reflective and critical analysis of the reasons for the

emergence of particular strategies, or indeed of the emergence of this functional aspect within the discipline of Information Systems - in terms of a socio-historic development.

One of the most important works to emerge in the utilisation of Structuration theory specifically in Information Systems is that of Walsham (1991, 1993a, 1993b, 1993c - see also Waema & Walsham, 1990). Walsham (1993a) in particular has been very influential (see for example Murray & Dhillon, 1996; Hackney, 1994, 1996) and remains referenced widely. This is a rich work which brings together significant theoretical issues serves to argue that the discipline of Information Systems is primarily underpinned by social theory. It considers the key areas of strategy, evaluation, design and development and implementation at first glance in a persuasive manner. One key element to this is the interpretation of Structuration theory. The assumptions promoted in the research that underpins the work are summarised in Waema & Walsham (1990 p. 34).

- Information Systems strategy formulation is a socio-political process in which formal-rational mechanisms form an important part;
- information systems and formal-rational mechanisms are aspects of organisational context, which is not neutral; individual actors and groups can mobilise and exploit it to influence outcomes and to legitimise preferred decisions and actions;
- Information Systems strategy formulation processes have a dynamic and reciprocal causal relationship with the internal and wider contexts in which they are embedded.

The detail on content of strategy from the historical contexts of the cases and the social processes involved are interesting and useful. However, it is argued that the work tends to focus on *internal* organisational politics and procedures in a similar manner to Ranson *et al* (1980). There is no evaluation of the wider or outer context. The varied interpretations of social 'struggles', the needs of capital or issues of social class are not of concern (see Bridges 1994). The utilisation of Structuration focuses is on the organisation and the impact of changing markets and government regulation. There is little analysis of managerial legitimacy, for instance, which may consider issues such as 'gentlemanly' conduct, 'scientific' approaches to the discipline of management to legitimise key perspectives, techniques, norms and procedures, interpersonal contacts, friendships (Giddens 1973, p. 171, Stanworth & Giddens

1974) and the ultimate ability of the individual to control or to *impose* a strategic vision. There is only a rather tacit reference to some of these issues (Walsham 1993a p. 152) derived from classic corporate strategy literature, i.e.;

"...Apart from issues of the morality of deskilling work, the point is that the strategy of total control is naive; it cannot be achieved and attempts to move in that direction can often result in reduced organisational effectiveness"

Whilst the legitimacy of the discipline of Information Systems is derived from simple notions of market pressure, there remains a further issue in socially oriented research. The reasons for doing so may well be the need for change and to adapt to market forces. However, according to Structuration Theory, humans (including 'end-users') are not some sort of myopic moron or organisation 'dopes' (Holstein & Gubrium 1994). They exercise interpretive discretion and these are themes encapsulated within the concepts of 'indexicality' and 'reflexivity' (Giddens 1984 p. 41). Further, there is little analysis of other power groupings which might resist change. It is as if there is benign acceptance of change suggesting that managerial Agency is supreme and institutionalised, or that issues of power have been ignored in the interpreted texts. The imperative to adjust to the external environment is an overriding feature of the accounts on strategy formulation and implementation. Power, it seems, is based around an 'understanding of the market'. The politics of the social processes are not detailed and ironically remain central to Structuration. In other words, there is perhaps a danger that Information Systems strategy might be overly managerialist in outlook which brings with it certain explanatory shortcomings, as Klein & Lyytinen (1985) p. 154 suggest,

"if industry leaders cannot explain how their approach differs from that practised in totalitarian societies (e.g. by being able to demonstrate how they design systems with the people for the people by the people), then the Western world is in trouble."

There is clearly a requirement to consider the wider social environment within the discipline of Information Systems and its impact on the different functional areas in practice or as part of the academic discipline. In this way, the *discipline* can reflect better on the role that Information Systems plays in the changing social relationships. Perhaps more importantly for the current work is the ability to that such an interpretation of Structuration will develop understanding of the 'orientations' as described in the previous chapter.

3. OPERATIONALISING STRUCTURATION IN THE SECOND INTERVIEWS

In the above discussion, there are obvious difficulties in applying Structuration Theory. Its breadth and epistemological ambiguity are seen as difficulties. Nevertheless, the framework was seen as useful in broadening the analysis in a number of different directions. The focus needed to remain on the phenomenological world of the interviewee 'subjects' to see if some of the themes embedded within the theory of Structuration were applicable. It was decided to investigate some central dimensions:

- The role of power within *and* outside the organisation as part of the phenomenological world of the subject, explored by the researcher;
- How the informal activities played a role in formalising the information strategy content, as expressed in the SAP implementation (the *process* of Structuration);
- The effect of skill level and its perceived role (skill level or 'expertise' as sanction for the perceived role);
- Bureaucratic 'constraints' on potential innovations;
- Fundamental perceived threats that could be interpreted to motivate a 'social defence'.

In this way, Structuration Theory opened up further issues to be explored in explaining the orientation taxonomy described in the previous chapter.

THE SECOND ROUND OF INTERVIEWS

It was decided to be far more structured and focused in the second round of interviews, focusing on some of the key themes as detailed above. There had been slight changes in personnel, which meant that not all the first interviewees were interviewed for the second round. However, fourteen further interviews were arranged with the original seventeen

(which excluded the 'opportunistic' orientation). An initial checklist of questions was drawn up, though it was recognised that to enable the 'flow' in the interview, these might not be strictly adhered to. Furthermore, it was also recognised that the motivations for the second set of interviews was to investigate the more 'personal' details: the fears of individuals, the power, the social groupings, the formal sanction for action from within the organisation, the role of expertise in enabling such sanction, and the relationship between end-user applications and that of formal information strategy. This set of interviews were 'tricky', and the better prepared, and the best possible focus was deemed as necessary. However, the personal relationships that had built up during the first set of interviews had been developed, and this was seen as helpful. The following interviews are set out with reference to the 'orientations' as detailed in the previous chapter.

ISSUES OF POWER 'OUTSIDE' THE BOUNDARY OF ORGANISATION : JOB SECURITY

Martin (realist) articulated his perceptions regarding job security with apparent confidence.

My position is as secure as any. I know that there is constant restructuring here, and SAP means that there is quite a lot of change going on.... but I know nowadays you've got to go with the job....

There has been a significant reduction in head count whilst I've been here....

My involvement with SAP has if anything helped my position here.... In fact I go down to Windolsham [the headquarters]... because of my involvement with SAP....

Martin expressed a certain confidence in his own position, and had expressed that his involvement with SAP had in fact enhanced his value to the organisation. His involvement in SAP was a strengthening of his employment position and of his career prospects. This confidence was echoed by Kay (realist).

I'm doing more work now than ever before. I am in more and more demand... I don't know if it a good thing.... No I feel my job is secure.

Kay had seen her role increase significantly over the three years that she had been employed, and (like Martin), had little doubt of her value to the wider organisation. This was not entirely true of others.

Jane (realist) feared for the changes.

....well we're all expendable now. There is not one of us that don't fear for the changes in some ways. I'm lucky because I know I can go to other companies easily enough, but that's not true of everyone. I think once you get to 40, then it becomes a different picture, and I know that some people here feel a bit stuck.

Indeed there were more vociferous fears expressed by Iain ('frustrated' realist).

No I don't fear for my job here particularly.... But I know I could be moved around a bit... I used to not mind that, but now I have kids in the local schools and stuff, it would be a big upheaval ... if I got wind of something like redundancies, I'd register at the agency....

Simon (doubter) also expressed similar (though relatively slight) worries.

There's too much work to fear for your job... but I know that even qualified people.... keep it at the back of their mind. You've got to look for other opportunities.... We even have a joke here [associated with lottery numbers!]... You've got to keep your eyes out....

These were typical responses from most of those who were on full time contracts. However, a different set of responses came from those on temporary contracts.

Keith ('frustrated' realist) quipped that

I know I've got a job up until October.... after that I'll be out on my ear.... I accept that... I hope that they'll offer me another contract and if I keep my nose to the ground, I may get one.... But you can't rock the boat in my position.

Researcher: *Why would you want to rock the boat?*

Sometimes things can upset you [description of an event] ...I should be more critical of things that go on. Its not a bed of roses here and there are a number of dumb things that go on too.... I don't want to upset anybody, so I go along with the flow... [implying that if he was more critical, then his contract would not be renewed]

Sarah mentioned something similar.

I've got to make sure I impress a bit, because I know I won't be here unless I do.

Lester (doubter), on a permanent contract was the quite vociferous about the lack of job security.

....there's been so much chopping and changing around here, its like a merry-go-round. One day things are going whizzing round OK, and the next you've fallen off. Its not happened to me yet, but things are changing A few years ago it would have been seen as dead secure But now its all different. I had always assumed that a profession like this guarantees you your job: nowadays I recognise there are no guarantees.... Its quite worrying really, but you just have not got to think about it.

The most confident response was from Phil (defender). This was initially a bit of a surprise because it was expected that the 'defender' would be the most likely to be 'defensive' about job security. It was expressed in a round-about fashion.

Well we all know we could be gone tomorrow.... That's the world of today I guess... but I know I'd not be the first to go because of my experience. I know the place too well... the place would collapse if they got rid of the people with the experience...

Researcher: *Do you think your application makes you more indispensable?*

Well, I suppose they'd be able to find someone else to do the business on it, but it would take them a long time to do it

Researcher: *If you were told that you were going tomorrow, would you take your application with you?*

No, I'd re-format the disk....

To the same question, Jane (realist) responded:

*Well I'd feel p*** off, but I would not have it in me to walk off with everything... there would have to be a complete disaster for that to happen, and I'd probably understand that... The company would not make unnecessary redundancies.*

The conclusion here had to be that there was not necessarily a direct link to the different orientations but there was a certain consciousness about the insecurities of the job market; this was common of all groups and did influence action; there were references to 'rocking the boat' and to 'experience' and 'knowledge'. There was general agreement that things were not easy, and it was important to 'impress', though it was across the board, rather than typical of one orientation or another. The themes were developed towards the link between these fears and that of the respective applications.

Dave² (defender) again expressed this vociferously.

No other bugger could know what [maintenance] jobs needed doing. Yes we have the routine stuff, but you've got to know the kit inside out to know when stuff needs doing.....

No, nobody could take the [maintenance] system [application] that I created ... and use it in the proper way.... There is too much to know.

This contrasted starkly with Martin's response.

Well, it is something that needs to be organised.... We need to get some documentation on this system [application].... It could be a bit of a disaster if I got run over by a bus tomorrow....

THE SOCIAL GROUPING AND THE ROLE OF 'EXPERTISE': THE CASE OF THE UPLOAD PROGRAM

In 1992, there was an initiative to try and amalgamate the work of a number of 'unofficial' applications, with that of the mainstream accounting system. The users in this case were again from the Accounting Services division. Here are some quotes from the tapes, derived from two users who were reflecting on why a particular 'upload' application had originally been developed and why this particular data was done on a PC which in general was perceived to be much more in their control than the central technology applications.

Martin (realist): *We need to make sure all accounts balance. Sometimes a discrepancy occurs, and we have to find out the reason. So we make a transfer, from one part of the business to another. But we want to make*

sure that that the effect of doing that is not detrimental ... we check the effect on the spreadsheet, and then if it seems OK, we do a transfer, and the data needs to be uploaded”;

Simon: *[It is]...cooking the books if you like;*

Diane...*its only paper money. Its not real, it just means that it balances;*

Martin: *The auditor knows that it has to be done...*

Where transfer payments between internal accounts needed to be done, then this was in fact recorded on a spreadsheet. Such transfer payments were needed between cost or revenue centres within Oxygen Supplies. In fact this unofficial work was extended to include inter-business transfers, and was standardised as a procedure when SAP was to come on-stream. Occasionally such transfers were made between Oxygen Supplies and trading partners also. The need to do this outside the main accounting system was to maintain control over what were primarily seen as ‘discrepancies’ (Martin) which occurred for a variety of reasons. The system devised by the information workers to enable to rectify such discrepancies in one big batch, and to model out the changes before they were committed to the mainstream accounting system. It was a classic case of legitimization of such an activity dependent on the ‘expertise’ of the internal accountants, and in reaction to changing needs. It meant that reconciliation could be achieved without the use of the centralised IT application, and once the data was checked (controlled) then it could update the central system - which of course was periodically audited. Of course the unofficial applications systems are not audited, which allowed the freedom to make sure that ‘...everything was going to look right’ (Simon). Discrepancies and anomalies could be ironed out prior to entry into the main system. In 1992, this had become common practice, legitimated by the professionalism of the Accounting Services department; indeed a number of staff within that section would use this technique to integrate and control sets of activities. The technology was controllable, it could be modeled prior to upload, and checked. However, there remained a number of problems.

Firstly, the data had to be in a particular form for the central accounting system to be able to read it. Thus a certain amount of translation had to be done prior to upload. This was in fact quite an easy task, but it needed a certain level of knowledge and skill in order to ensure the correct format. Secondly that the data needed verification and validation. There had been cases where data had been uploaded and fields were in fact incorrect.

It made perfect sense therefore to write a program to automate these tasks. The Information Systems team were asked in 1992, but they refused to do the work, based on the premise that it was an '*...end-user task*' (Martin (realist)). In fact there had been a dispute between the Accounting Services section and the Information Systems section over the validity of the whole exercise and associated activity. If the activity was not formalised into mainstream IT applications, then it was not right! Accounting Services thus took the job on themselves, by employing a '*bright graduate*' (Martin) who was at the time still studying for his final CIMA level. One of the immediate tasks was to program an 'upload' validation and formatting routine. This program was the forerunner to the code found in appendix 3. The code took several weeks work and a great deal of learning by that individual. It was not documented, it had basic errors in it, but it served a purpose - namely a validation and formatting utility to ensure mistakes were not made by users, prior to uploading the data into the mainstream accounting systems. It was the product of the informal utilisation of the available technologies which became a mainstream activity.

Significantly, this was perceived of being key importance. The procedures to model the data became much more formalised. It generally became common practice to model out account changes outside the main accounting system, and then upload. As mentioned over a period, this type of activity expanded to inter-business uploads. Of course it was not planned or designed in a formal manner. Rather it *emerged* from the necessity to control information, outside (from Accounting Services perspective) an uncontrollable centralised technology. It in fact meant transferring from one to another application to achieve it.

However, when the new SAP application was being implemented, there was of course the key need to change the numerous multiple upload programs. It became an essential requirement of Accounting Services. Furthermore, this type of activity had become such a key part of the activities of this department, that it did not want the Information Systems team involved. In fact, by 1997, the Information Systems team had approached Accounting Services to integrate the upload program into the SAP implementation. Now recognising its importance, and fearing that it might move out of the control of Accounting Services, they decided to employ an external consultant to develop what was now quite a complex suite of programs. It was important to the Accounting Services section because this activity had become a substantial proportion of its work - reconciling accounts, checking that each cost or revenue centre was 'correct', and to ensure the integrity of the data. The upload programs

were therefore of political significance, despite technically being relatively poor and inferior. It was justified because of the need to iron out integrity problems in the data, model and control those changes etc. The Accounting Services needed this area of work, and it had become an accepted method of work in a five year period between 1992 - 1997. This is expressed by some of the following comments:

Simon (doubter): *We have to look after ourselves. We cannot give work away.*

We need to do the upload stuff ... its crucial to what we do.

Researcher: *Why is it crucial now, yet only a few years ago it was not?*

Well, I suppose everything is computerised now Information Systems cannot get hold of it.

There was an interesting difference in emphasis when moving from one orientation to another.

Martin (realist) : *We have to use the upload routines to integrate our work with SAP.*

Indeed, the programs were subsequently 'exported' to Oxygen Supplies' sister companies in Australia and Ireland. More significantly, it was decided informally that SAP could not handle this integrity issue, and it should remain the domain of Accounting Services as an ad-hoc and controllable activity. Legitimation derived from the professionalism of the accountant and rationalised against the need to obtain and manipulate information which the central Information Systems could not provide in standard systems. SAP of course *could* handle inter-account and inter-business transfers. The political process of excluding Information Systems from decision making and associated rationalisation was justified in that they had already high levels of commitment in the SAP implementation project. Despite being approached by Information Systems to do the work, if they (Information Systems) were to undertake the re-write of these applications, they would need to take on extra staff. These extra staff were already a bone of contention within Oxygen Supplies more generally. In the period September 1996 - July 1997, Accounting Services had lost several posts. Cost cutting and reduction in people was very much on the agenda in Oxygen Supplies at the time, and it was not possible that extra staff could be taken on. The (politically) easily implemented

policy was to keep the status quo, and have Accounting Services develop the program code with the aid of an external consultant, and thus ensuring that they continued with this work. Thus this was excluded from the SAP implementation and in effect incorporated into formal strategy, not for rational reasons, but 'rationalised' reasons against a series of circumstances, which were politically satisfactory.

Politically, this technology had become very significant, and had embedded itself into mainstream strategy in the implementation of SAP. What was a relatively insignificant program become of significance to the Accounting Services. It was a case of clearly demarcated boundaries, or lines of bureaucratic structure, which affected the decision making.

Researcher: *How many man days are taken up by dealing with the integrity issues [the manipulation of the upload data]?*

Simon (doubter): *Well a few of us deal with it. I'd say one us is involved most of the time. That's our job I suppose - well part of it, but you know what I mean.*

Researcher: *Yes. Its important then?*

Of course it is. I know what you are implying. If we automated that, one of us would be on our bikes.... [laugh] Might be a blessing!

'CONSTRAINED' INNOVATION: THE CASE OF SUPPLIER JOBS AND INVOICING

There has been work done on the application of Structuration and innovation (Jones 1997). This application is selected for discussion because it seemed to demonstrate high levels of potential, and innovative insight (from a 'doubter'), and yet the ideas were not developed fully for a variety of reasons, which are identified as structural 'constraints'. The case of the users in Oxygen Supplies suggests that there are 'no best' or solid benchmarks to evaluate end user application of information technology. Nor is there a 'best orientation'. However, information management from social analyses can illustrate further dimensions than the 'justification' of rationalisations of data - as dominant in the Information Systems strategy literature. It can reflect on the motivations of the application of the technology, particularly by widening the analysis in an increasingly holistic manner, can assist in the critical reasoning

process. This is as applicable to the user as it is the Information Systems specialist. The critical awareness of the subjects in this case demonstrated little such opportunity. The final application that follows was looked at briefly in the first round of interviews, but was expanded in the second round.

The case study focused on the 'informal' applications which to a large extent fill in perceived 'gaps' in the current information provisions. However, there was evidence that there was a willingness to be innovative in a way that was much more than 'plugging the gaps'. However, the user in this case was motivated, not by some sort of incentive of enhancing a career, but it was perceived more of a 'defence' or 'justification' of his role/position in the organisation. Simon had a degree in Finance, and was studying for his final level CIMA qualification. The code of the application is found in the appendices, and involved dealing with regular suppliers.

Where there are no direct pipelines into large customer manufacturing units, the gas business is very dependent on transport to deliver gas in liquid form in varied cylinder sizes. In fact Oxygen Supplies has its own distribution company.

The application described here is one where it was realised that huge numbers of invoices were coming from relatively small number of suppliers. In fact, some similar items came from different suppliers. These needed to be cross checked, recorded and authorised for payment, estimated to take approximately 10 person days per month. Again this was done by the Accounting Services section. The technology application came from a suggestion from one of the customers.

The idea came from a customer really - who wanted a single supplier. That was us. Reliance on one supplier can be beneficial because we can squeeze profit, and ... of quality.

Whilst a little confusingly expressed out of contexts, the quotation picks up on the power issue across the supply chain (see Rao *et al* 1995). Suppliers for the maintenance of the fleets are fundamental to the distribution network. The goal of this application was to purchase goods from a single supplier, rather than

going all over the place...

The objective regarding the establishment of constant supplier details was to cut down on the invoices received and therefore increasing control. Instead of four or five hundred invoices being received, the goal was to make the technology formalise invoice procedures, and therefore simplify the overall handling of this ‘cumbersome’ work. Thus regular suppliers, it was proposed, would insert into a computer all jobs undertaken in a given period, and send a single invoice on disk with the details of the jobs (dates, work done, fleet number, Oxygen Supplies’ cost centre codes...) also on disk. It meant that a database of cost centre codes linked to fleet number needed to be given to the suppliers. There were 2000 fleet numbers operating from the local plant alone. The information worker concerned set this up using Visual Basic, and recognising the benefits

...it will make it easier for them, and it will be easier for ourselves.

Without realising it, this innovation links to some of the classic ‘advantage’ concepts (Galliers *et al* 1995). However, it was realised in a more informal manner:

...trailers have the vehicle reg, therefore needs fleet no as the key. There’s about 1400 vehicles on Gases - but there are a lot more really. Distribution Services etc. may be interested in this application, therefore it could be used elsewhere - particularly in Europe. With the differences in currency, this might be a difficulty in liaison with the supplier.

As the idea developed, there appeared to be certain integrity problems. Error checking was seen as an issue, but it was not translated into the final code (found in the appendices). There was not time to

...do it properly.

In fact Simon found Visual Basic frustrating and hard, but produced some simple prototypes.

Interestingly Simon did not *assume* getting any credit for this innovation. He had been working at Oxygen Supplies for five years, and had felt increasing pressure over that period. Re-iterating several interviewees:

We are all expendable now...

However the application was still motivated by a drive of certain recognition.

...If you have any more changes, send him up (referring to himself).

It was a case of somebody working “*behind the scenes*” to secure their own position - because of demand for their services. The hope was that technology could enhance that credence. Further, there was certainly an awareness of the organisation as a hierarchy despite superficial claims of having a “*multi-skilled workforce*” and “*organic and flexible structures*”.

In July 1997, the prototypes were still...

...sitting on my computer. I just have not had time to do anything with them.

It seemed that this ‘empowered’ employee was not empowered enough. The growth in interest in downsized, flexible work structures, and the empowerment has been seen as a bit of a managerial ‘holy grail’. The shift is one which depicts a movement away from the ‘command and control’ to ‘facilitate and empower’. This has been reflected in some of the Business Process Re-engineering literature. Yet this trend seems to contradict the traditional labour process literature which sees de-skilling as a trend in historical accounts of the monopoly capital era, in order to achieve control over the workforce. It seems that there is an apparent and fundamental contradiction which requires analysis and synthesis. There is evidence in this case that suggests a holistic analysis, which moves away from the central role of de-skilling in the control of labour. Whilst accepting the key notion of conflict based on the conflicting interests of capital and labour, de-skilling is only one factor in the process of changing work relationships. As already mentioned, those in the case were highly skilled, although as detailed in the discussions developed so far, there seemed a lack of questioning and reflexivity in everyday activities. Yet as has been seen, even in highly skilled labour, middle and senior management share a view of ‘inevitability’ about job insecurity. During the course of study, one of the six interviewees left to have a baby, one moved to another branch (and in neither case replaced); another feared his temporary contract would not be renewed. Yet all were well qualified, articulate and educated. There must be of course some comment to be made on the labour process here (see also Giddens 1990).

The current stage of industrialisation, having developed an increased global dimension,

results in a general recognition that change is necessary for survival. The strategy in Oxygen Supplies necessitated global planning. The field of Management is currently struggling in meeting the demands of increasingly competitive business environments worldwide and other factors such as the volatility of currency movements, new innovations in communication and computing technologies, deregulation, privatisation, quality frameworks and consumer or customer value for money. Drucker (1988), describes the history of the field of Management (practice and the discipline of) to have entered the third of three phases. The first was a movement to separate the ownership and control of organisations when shareholders appointed 'expert' representatives to manage their interests. The second phase was the development of administrative techniques to plan and monitor corporate development resulting in the restructuring of large companies into multidivisional forms. The third phase, he argues, has been to shift from a 'command and control' (Kanter, 1989) approach to management, towards an information based organisation in which cross functional teams tackle problems and exploit opportunities. This 'facilitate and empower' phase (Kanter 1989) is based on the empowerment and commitment of all staff to shared values. It results in analysis which is much more muddy than depicted by Braverman (1974) (see also the comments on this by Bellamnt Foster 1994, Greenbaum 1994). These 'values' displace the outdated and sometimes inflexible regulatory frameworks typical of older management periods, and guide employees to form and reform collaborative teams and networks through which the mission of the enterprise is fulfilled. It is a phase (of 'management') which is characterised by an appreciation of the organic nature of organisations which is dependent upon the effective development of human resources to cope with ambiguity. Multi-functional teams rely on participative approaches to problem solving, where the role of management is that of facilitator which acts to enable the self-discipline of employees and alignment of activities to wider business objectives.

"... the responsibility of the managers who remain employed is to act as 'facilitators' who ensure that the staff are fully equipped, materially and educationally, to work organically - for example, by developing new project teams that exploit emergent opportunities - and are thereby enabled to develop synergies and deliver their commitment to the organisation. Managers then become responsible for achieving this result, and are rewarded accordingly, and not just on the basis of their formal position." (Ezzamel et al, 1994, p. 456).

The increasingly interdependent relationship between staff means that the performance of individual managers rests on the capacity to mobilise contributions from staff over whom there is no formal reporting relationship. The hierarchical position is supplanted with the

interpersonal and political skill in negotiating intra and inter organisational strategic alliances. The formal is replaced with the informal. Information is of central concern in this scenario; but not rigidly controlled or specifically designed for specific human activity. The third phase of Drucker(1988) it seems argues for the movement away from the formal 'modernist' assumptions of previous years. But of course, his is only a model; it is not based on research on *everyday* occurrence and grounded perceptions. Comment is further developed in the following chapter of this theme.

Thus type of characterisation of the Management discipline, and in practice, requires further investigation in everyday types of analysis. They can represent bold assertions of (perhaps genuine) intent. However, it might be argued that beneath the surface of the new 'empowering' modes of organisation, there remains threats, conflict and control. Whilst the field of Management focuses on the theoretical reasons for movement away from 'hierarchy and control', it remains difficult in practice to change the culture of organisations towards genuine trust, learning and sharing of power; secondly, the implicit change can be painful and is resisted (initially at least) because of uncertainty and insecurity. And thirdly, and more generically perhaps, the theory often tends to overlook key conflicts of interest which might be explained by aligning the new management theory to wider societal labour process conflict, characterised by capital logics in the late twentieth century. As Ezzamel *et al*, (1994), argue, the "...*Command and control organisation is frequently still lurking in newly 'empowered' companies.*" (p. 457). One of the key tenets of the 'empowered' organisation is that of skill level. It is of particular interest in areas of technology utilisation where it has been traditionally assumed in critical historical theory that the new technologies tend to de-skill, (Braverman 1974). This is a theme which is questioned by Zuboff 1988, who argues that the 'informing' role of technology requires new forms of information skill, competence and power which questions traditional approaches to work and organisation. Whilst those individuals within Oxygen Supplies were overtly highly skilled, they were skilled in specific tasks, and yet showed a lack of critical reflective questioning. It is therefore an important question of how reflective reasoning is achieved: something not easily accomplished as it is embedded within culture and structural constraints. In Oxygen Supplies, there was a distinct hierarchy, but more fundamentally a complexity of power relationships. The different plants were competing on measures of 'efficiency'; the Accounting Services were defending their interests and ensuring their future role; the information workers were using technology to counteract the formalisation and failings of central technology applications; individuals were concerned to be seen to increase their value and associated with this their skill level. There

were employment threats and defensive actions. Constructive reasoning, questioning and learning seemed to be tied up in such defences - or assertions of the 'correct' actions to be taken. Yet in their own way, the users had shown innovation in many applications: some were of obvious benefit to the operation of the organisation; others were not so obviously beneficial. All met certain objectives (albeit highly 'constrained').

None of the interviewees expressed that their application had been considered as part of the SAP implementation. This was rather surprising on first consideration, because it had been assumed that the informal applications would be subsumed into the formal, as described in Structuration Theory. It was initially assumed that there would have been occasions for some of the user applications to be incorporated into the formal planning in terms of the SAP implementation. Yet there evidence to show that the informal applications became embedded into work practices: whilst was not part of the formal information planning, there was a formalisation that did take place; this theme was taken up further in analysing the routines of several applications as they had developed, and were continuing to develop. In fact this point is exemplified by the case of the upload program, which became embedded into mainstream activity, not through rationalised reasoning or formal strategies, but because of the social interactions of the social groupings.

4. 'TESTING' THE HYPOTHESIS

Following Bloor (1978), it was now possible to test the validity of the approach taken, and the construction of the 'orientations', linked to some of the societal pressures derived from the operationalisation of Structuration Theory. This involved deep reflection on the validity of the 'orientations', the use of Structuration and the empirical evidence. There are a number of aspects that are to be explored here.

- I. Reflections and epistemological assumptions
- II. The generalisability of the case, the 'sampling' used: 'testing' on other cases.
- III. Impact and conclusions for the discipline and in practice.

The first two are don in this section and the latter of these is developed in the following chapter.

I. REFLECTIONS AND EPISTEMOLOGICAL ASSUMPTIONS

By using the analysis so far discussed, it is possible to draw out some key assumptions of the varied schools of thought in the discipline of Information Systems. The stress in Giddens' (1984) work on contradiction and diversity on social setting is one which it is argued demonstrates the limitations of the more constraining attitudes towards Information Systems practice. Perhaps the essential conflict of capital and labour has been somewhat muddled by the larger managerial controlled organisation (Hyman 1987; Armstrong 1991). However there are distinct self interests which are derived from social insecurity (see Wastell 1996). Added to this, the complexity of any one context, has resulted in the idea that many individuals work in organisations, are not seen as directly or *only* as a profit maximisation machine (an assumption of some of the Information Systems literature). There are often a range of competing managerial 'logics of action' within any one organisational circumstance. The result is that managers, whilst still in an economic logic-controlled environment, are faced with a variety of often conflicting rules of conduct, of which many can be rationalised against different criteria's, and some with no obvious superiority. This explains the subjective views of users, reflected in their applications: each had a 'justification': it was real and absolute, or prompted by a perceived lack of information, characterised by a sense of scepticism, or as a social defence. Yet in each case, there was a lack of critical awareness regarding the effectiveness of the responses, the wider information impact, consciousness regarding the 'bounded' sectional self interest or motivations. When this issue was understood, by using Structuration (where structure plays a role in determining information need, often linked to sectional self interest). Thus if this is accepted, then the question becomes one of developing the ability to *critically* diagnose, by those involved in Information Systems practice.

Yet at times the 'orientations' seemed rather removed from reality. Could human use of technology be really that blinkered? Could the research data be believed? It needed verification. That verification came in a number of ways.

Firstly, it was realised that the answer to this was in the sample. In all cases, these were information workers, developing their own *information* applications by the direct manipulation of certain technologies. These applications were not simple transaction oriented applications.

They were all trying to 'better' information in some ways. It was not the gathering of data, with a simple calculation and print. These people were creators and innovators with information, making some sort of *intervention* to perceived 'problems' by making use of powerful technology. They were reacting to the *everyday* events, and formal information provisions, and *formal information strategies* which themselves are forms of intervention.

Reflecting on the notion of formal information strategy and strategic intent

The outcome of this type of analysis is that the generation of strategic choices have to be seen in alternative ways to simplistic notions of 'rationalisation', resulting from changes in the market (or simplistic views of management action to 'fit' the changing economic environment - see chapter 4). Any intervention is socially constructed: users play a role and 'borrow' values and apply multiple rules and resources. Roles, as members of a structural form such as a family or communal grouping, such as local authority, also has influence on the strategic choice and thinking. In that sense, users do not rely entirely on their perception of the capitalist adaptation to market forces.

For instance, to see a strategy or intervention as entirely an alignment to changes in the market is to miss some of the key aspects of the strategy formulation process itself, which is a behavioural issue. Thus it raises the issue of different assumption is in the discipline of Information Systems strategy. The 'classical' school in Information Systems strategy has a primary focus on information technology investment, and alignment to the business objectives, market and context. The discipline of Information Systems has also been seen as needing to recognise the socio-political elements in the formulation and on-going implementation of the associated strategies, with an emphasis on information and its associated power in social contexts. Thus there may be an opportunity to draw out a 'taxonomy' of some of the key assumptions of some of the approaches taken in the discipline of Information Systems as shown in Figure 6.4.

	Managerial sphere	Assumed goals	Primary focus of study
Classical	Technology management	Evaluation of IT within business context	Comparative advantage / industry sector analysis
Interpretive	Information management	Effective use of information assuming economic & market constraints	Internal organisational social structure
Critical	Information management	Information as power, its use being determined by societal power criteria's	Societal determinants of organisation social structure

FIGURE 6.4: TOWARDS A TAXONOMY OF INFORMATION SYSTEMS ASSUMPTIONS

The use of Structuration in the way defined earlier in this chapter has been towards the Critical, rather than the commonly cited 'interpretive' framework (Walsham 1993a). Agency is a complex interplay of numerous forces. Issues of power, influence, conflicts of interest and (often informal) social grouping therefore play a key in the development of structural forms. Human beings in a corporate environment often exploit their multiple social identities, and this legitimises their conduct and decisions at work. Information Systems practitioners can justify their decisions via an account of professional 'expertise'. Yet the context of the decisions cannot be seen as 'objective' or 'apolitical'. Those that they wish to influence must also acknowledge the legitimacy of underlying assumptions, values and motivations. Since the sources of influence can be varied, managerial authority does not *only* rely on understanding of market, ie, CCT, or indeed narrow interpretations of the nature of capitalist society, or to see strategy as primarily guided by profit maximisation. It seems that Information Systems remains a key concern not just as an alignment of business to its markets and how Information Systems contributes to its long term success for society as a whole. It is also important to understanding the social processes associated with it. Whether or not we wish to align such analysis to wider Critical issues and/or historicism is a question of epistemological perspective as detailed in figure 6.4. However, the future of Information Systems research is not to produce simplistic 'strategic alignment' models without also a deep

reflective analysis of the everyday utilisation of information and technology, and consideration of the socially laden assumptions that it is making. If it does that, it is in danger of limiting itself to the practice, rather than informing the wider issues of the discipline. It is in fact an argument for greater critical reflectiveness in research, which can help inform critical reflectiveness in the everyday practice.

II. THE GENERALISABILITY OF THE CASE, THE 'SAMPLING' USED: TEST ON OTHER CASES

This section uses the epistemological position thus far developed for innovation at the 'end-user' level and applies it in a very different context, and thus making comment on the applicability of the theoretical notions developed so far. It is based on research undertaken by the author during 1997 and early 1998 with a small working forum of intranet users. These were gathered from a number of major organisations largely from within the IT industry, with whom the author has contact. All the represented organisations are global firms, mainly with American or Japanese head offices. All the subjects were senior and middle management with specialisms in Human Resources or Information Technology who were involved in the development and/or management of company intranets. Companies included representatives from Novell, Fujitsu, BOC, Hewlett Packard, SUN Microsystems, Dell, NCR, Compuserve, Xerox and Digital. The contacts were 'gathered' on a voluntary basis for the purposes of discussing ideas and understandings around the use of company intranets. There were twelve people contacted ranging in position from a vice-president of European Human Relations and two corporate webmasters to a junior employee compensations manager. The sexes were equally represented and all were in their mid to early thirties with 'high potential' positions in leading organisations. The 'contacts' had a range of technical expertise, but were all closely involved in different aspects of the specification and use of their company intranets, developing web applications for a variety of purposes and goals, largely for internal organisation information dispersion, but also for pages that were publicly available on the Internet. There was a desire to share the varied approaches to issues including application 'standards', personal freedom of usage, workload implications of intranets, system security and system integrity amongst all those contacted. In each case the individuals reported widely varying corporate policies with respect to aspects of intranet development and usage, from intranet role, to page development, management and employee access. These ranged from tightly controlled and strictly monitored applications specifically geared to achieving set targets, to controlled applications by senior managerial

decisions. Whatever the approach, though, all had expressed concerns both during the formal meeting and in casual conversations that “*the balance might be wrong*”, and seemed to fear that some aspects of the intranet use was not necessarily ‘controlled’ properly.

... we hear cases of litigation all the time Putting stuff on the net is like putting it on the front page of The Sun

The two Novell interviewees focused primarily on the challenge of developing an intranet that served Novell EMEA (Europe/Middle East/Africa), but was consistent with Novell North America’s intranet. The two were the Development and Training Manager (EMEA) and the Development Specialist (EMEA). Novell’s North American corporate intranet was launched in 1994 with the Novell (EMEA) version following in 1996. Novell (EMEA) and has bases in 22 countries, all of which are part of the intranet. The Development and Training (D&T) Division (EMEA) became involved in early 1997. As of early 1998 the different functional departments within Novell (EMEA) operate distinctly separate components within the umbrella of the Novell (EMEA) intranet.

EMEA HR only jumped on the intranet last summer, six months after EMEA D&T.

Both representatives were users (ie non Information Systems specialists) who had developed the ability to produce their own Web pages, having been introduced to the intranet 18 months previously. The justification of their use of the Intranet technology was couched in ‘realist’ and ‘rationalist’ language:

It was part of a policy to create ‘one Novell’ through a world wide intranet strategy.

It was to communicate across different cultures, to enable the business, and empower through a technological infrastructure.

The core requirements for Novell (EMEA) was said to be:

[their] ... intranet should be consistent with the existing American intranet.

[it] ... should reach every EMEA country and employee

[it] ... should reinforce the EMEA identity

[it] ... should be relevant and up-to-date.

Interestingly, Novell (EMEA) chose to tailor the US application standards, going so far as to require that all pages be in American English, a decision taken by a senior executive (who is a German national). This suggests a conscious decision to play down national differences on the intranet.

The development of a role for the Novell (EMEA) intranet was couched entirely in realist language - using highly 'rationalist' language - as depicted in the realist orientation.

[we use the intranet to] capitalise on our technology

Researcher: *What do you mean by that?*

At Novell we have the latest kit. We need to make use of it.

Researcher: *The better technology gives better information.*

Of course... in general, we need to use our technology to get ahead.

The influence of American colleagues' thinking was apparent in numerous written and spoken references to the importance of

... partnership with the experts sharing best practice ... with those guys

At no time, however, was there a suggestion of two-way or critical learning or questioning. Novell (EMEA) was seen as the junior partner with Novell (North America) the senior. Effectiveness in information meant interpreting what was expected.

We take their ideas, and incorporate them into our pages.

Researcher : *Did you decide that the EMPA needed a web presence?*

Yes. I was brought in to do it.

Researcher : *So it had been decided before you arrived?*

Yes. Of course. I was brought in to make it happen.

It was deemed as necessary to 'sell' the pages to Novell employees. It was seen as important to 'show its value', 'make it easy to use', 'make it interesting', 'accurate' and 'fast'. The interviewee was concerned to justify the applications in essentially 'realist' language.

It reinforces corporate objectives

It helps us move us closer to our desired culture

[It enables]... Information at our fingertips

Generates cross culture relationships

Also articulated was the 'realist' thinking when discussing the intranet usage, arguing that there had been general acceptance of the pages that had been developed amongst those reading it.

We are having high levels of 'hits'

Hits seemed to indicate in the minds of the interviewees, good information.

It means that we don't need to rely on information that is 'in people's heads'.

We can meet our company objectives [recounting the statement of senior executive of Novell]... "if its not on the intranet, then it does not exist..."

These assertions were questioned at some length. The interviewees revealed characteristics of the realist user orientation in their accounts, and they justified their actions in terms of their own perspectives rather than that of the recipient of the data. For instance one of the

interviewees named Brett spontaneously discussed how the growth of the intranet had opened up real career possibilities for him.

I am going to Paris tomorrow to help with some web page development over there. Its been great like that....

The skills that I have developed are central to the operation of our business.

I have a standard business studies qualification. I don't have a techie background, but I've taught myself and its easy to use....

Researcher: *Do you fear for your job?*

No. If they get rid of me, I'll find another company....

Researcher: *Because of your new skills...*

Of course. There's big demand out there....

In Brett's case, he had identified clear *personal* benefits in the way Novell (EMEA) is going.

It has been a career enhancement to me. I can't deny that...Being seen as a techie in this place [Novell] is seen as pretty good.

Webmasters control the company nowadays...Webmasters are the key to it all....I'd like to become a Webmaster...

The usefulness of the intranet as an information tool was not questioned. It seemed that any data on the web was better than not on the web.

Well, now we are putting all our activities on the web. It gets us known I guess...

The process of gaining acceptance and use of the intranet was justified as an organisational goal entirely on the grounds of information and rationalisation.

We can communicate to the whole of ... what we are doing in our section.

[Our aim is] ... Streamlining internal processes

This it seemed was a justification, rather than an actual belief.

Researcher: *What are your key internal processes?*

We'll everything to do with selling ... we have to develop our customer focus.

The vagueness of some of the concepts used was quite startling.

[The intranet] Moves us closer to our desired culture.

Researcher: *What is your desired culture?*

To be the biggest I guess.

Researcher: *Is that your desired culture, or the shareholders?*

We'll I don't know about the shareholders, but if I can help the business to be the best, then I have more chance of making it

Researcher: *Making it?*

Yes.

Researcher: *What do you mean by 'making it'?*

We'll, getting to the top I guess [showing a bit of frustration]

Researcher: *Your intranet helps this?*

Yes, it does. It gives us the opportunity to exploit the technology

The personal agenda, however, continually returned to the forefront of the discussion. Leslie agreed with Brett about the potential of the intranet to further careers for its instigators within Novell and pointed out how they had used that possibility to raise senior managerial interest.. For instance Brett and Lesley's line manager was eventually convinced that the data about the department should appear on the intranet page:

...because his picture was to appear on the intranet..... We convinced him because we got hold of this picture [pointing to a web page].... And its a really good photograph of him... he looks so healthy and tanned. We convinced him it would be a good career move for him to be seen.

Pictures were not just used to gain the backing of champions to launch pages. Page utilisation, is assessed by the number of recorded hits. Leslie related how informal emphasis was placed on

the sexy picture ... [of a senior executive on one page to attract the interest of potential users].

Brett and Leslie co-identified their own and the organisation's interests with respect to the intranet. The web had provided opportunity for them to enhance their own skills and profile within the organisation, and it was a matter of convincing others (including their own line managers) of its importance. The opportunity had arisen because of Novell's perceived need to enhance its brand across the globe, and its own self interest in promoting the network systems that it sells by '*...practising what it preached...*' In practice, though, there was little demonstrated awareness of how the information might be used, how it might add value.

It was striking how almost all the other contacts accepted the apparent lack of business clarity attached to the informational purposes of pages. Only one interviewee suggested that such an unfocused notion of purpose was not appropriate. Andrew from BOC represented the only organisation amongst the interviewee sample not primarily concerned with the sale of hardware and/or software associated with intranets to generate its profits. He stated that:

We could not operate like that. We are a manufacturer, and we could not have people playing on the web like that....

On questioning Andrew, he displayed a much more 'doubting' orientation.

... we're a bit backward really. I see this great technology which we'll have to consider...

Researcher: *What do you see as its benefit?*

...loads of things. Better communication between sites I guess....

Researcher: *More streamlining?*

God yes. They'll [the company] want their pound of flesh

His views contrasted with Bobby, the webmaster from SUN Microsystems, who explained that company policy was to allow users to develop their own pages on the SUN Intranet. The rationalisation for this was in equally 'realist' terms as that of Brett and Lesley:

Its all about innovation. We believe that giving people the freedom is about creativity.... Its empowerment.

Yet contradicting this there was the same sense of the development of a cultural identity derived from the application of the Intranets.

We believe that we should promote our identity.... People [within the company] need to identify with it.

Later, it was also revealed in a slightly contradictory manner:

Sometimes we have to make sure that some our own people recognise that they are the best. Yes and we do that through our pages. Call it ego if you like....

On the one hand cultural diversity was seen as a strength. On the other, brand image and serving singular goals. He continually referred to the 'system' with approbation, but noted with a smile that:

pages are buried deep in our intranet away from the public, and, anyway, it doesn't hurt that we can audit pages. Its audited anarchy.

On Information overload, it was revealed that there were different official policies on how to handle the level of information that technologies such as the WWW, Internet, Intranet and e-

mail enabled. Hewlett Packard were focused on 'profiling' users which took account of role, age, career prospects - and therefore came to conclusions regarding what was relevant information for each individual user within the company

These set of interviews were somewhat limited. The 'orientations' seemed to fit this very different technology, and the personal goals were the key motivating force, dressed up in language of 'efficiency', business objectives, 'strategy' and the like. Yet there was gross naivety in the effective use of *information*, or on reflections on personal motivations: there was little evidence of rich or insightful use of information, or a questioning of personal objectives and/or motivations. Whilst these interviews were limited, they did confirm innovation at an end user level was highly uncritical, and linked to wider social values around 'expertise' and motivated by insecurities of the 'jobs marketplace'.

It served to confirm that there was evidence of skills with information technology, but little awareness or evaluation or reflection on information. Such skills were assumed. Furthermore, there were strong personal motivational forces in the everyday use of technology, derived from insecurities of the social and economic context. Indeed there was evidence to suggest that the formal and rational information strategies of organisations were undermined and manipulated by personal or narrowly defined sectional interests. This aspect is further explored in terms of the limitations of the approaches and discipline in the following chapter. Yet the details of the issues raised above, have served to perform a test on the validity of the Oxygen Supplies case, as depicted in the guiding 'inductive' approach of Bloor 1978), and articulated in point 5 on page 76 of the current work.

CHAPTER 7

EXPERIENCE AND LESSONS: TOWARDS A LEARNING EPISTEMOLOGY FOR INNOVATION IN INFORMATION SYSTEMS

All of us who come through traditional schooling have heard many lectures where there is nothing more than an oral transfer-of-knowledge, a verbal channel for knowledge-transferring. Very rarely were we provoked by a creative reinvention of knowledge in front of us, in an exciting way where the language compelled us to rethink the way we see reality. This takes some practice for teachers.

Ira Shor, in Freire & Shor, 1987, p.40.

INTRODUCTION

It is seen as the *raison d'être* of the current chapter to draw some conclusions. This may be divided into two parts. Firstly, it reflects on how far the original objectives of the work have been achieved, and summarises the contributions that the thesis makes; in the second part some conclusions are drawn for the practice and the discipline of Information Systems. As indicated in the preface, the original objectives were as follows:

- the motivations of information technology users in everyday 'interventions' in perceived information problem solving;
- the question of how *evaluation* of 'end-user' application of technology is undertaken: this is both important at a methodological level, which will impact by informing some aspects of Information Systems practice;
- the changing role of the Information Systems specialist in enabling 'effective' technology *and* information utilisation in circumstances where non-Information Systems specialists *directly* apply technology for information purposes.

The first of these (*first bulleted objective*) has been the key focus. The thesis has demonstrated that there is obvious limited vision in the application of information technologies. This is demonstrated within by the work on the 'orientations'. The motivations of the 'realist' orientation were limited by vision, and critical and conceptual reasoning; formal organisation 'boundaries' and demarcation lines, as well as a certain intransigence for change, acted to limit the 'innovations'. As demonstrated, the visions (or lack of them) were assumed to be 'right', and were largely beyond question. The other orientations equally lacked vision and innovation, and were characterised by highly politicised motives. However, as shown in the appendices, this lack of vision was not the result of technical incompetence; explanation had to be sought in terms of the power dimensions of the organisation context. It certainly was true that powerful technology did not mean powerful information, and this was verified across a number of technologies. Of particular interest was the use of the construct of the 'orientations' in diagnosing the motivations of the intranet applications. By looking deeply at the motivations, rather than the technology, it became apparent that there needs to be a greater focus on learning, education, and the development of trust. This is discussed further in part three of the current chapter.

The issues of evaluation of technology application (*second objective*) are also of prime importance. For instance, evaluation of the technology application cannot be achieved by technical benchmarks; the criteria for evaluation are much broader, and involve diagnosis of personal and power dimensions. Evaluation can only be achieved by focusing on the behavioural interactions, and how some objectives are achieved, and others not achieved; it means in methodological terms that the phenomenological constructions of those who (implicitly) create the objectives must be investigated and developed. This involves a rich and qualitative discourse on meaning and interpretation. Yet the meanings and multiple objectives and assumptions of those involved can be challenged. This is not to say that there will be an 'answer' or 'solution' in an absolute sense, but is seen as a *process* of on-going and critical reflection. This position is commensurate with the 'subjective' pragmatic construction as reflected in figure 2.2 on page 53.

Yet such an approach is almost an anathema to the traditional role of the Information Systems specialist, whose role has traditionally been to provide 'solutions' in a rather simplistic manner. This reflects the *third objective*; the conclusions suggest that there is a greater need for the development of the learning process in technology utilisation. It implies

that there is a certain importance in the further development of the learning and education function within the discipline of Information Systems, which can help guide the practitioner, and the current chapter develops further this theme.

The thesis has achieved the objectives, by laying the foundations for the underpinning of the field of Information Systems as, not only a 'design' discipline, but one of information behaviour which encompasses an analysis of everyday information utilisation of information workers and consumers. There are a number of reasons why Information Systems is seen as a behavioural discipline.

- Information and its everyday application is seen as an element of Information Systems practice, and it has a key role to play in human activity 'systems'. As such the 'systems' are essentially human constructions. The conceptualisation of the 'systems' are forms which have 'boundaries' or 'structures' which are used by humans to justify and comprehend contextual complexity; how they are defined and used depend on individual cognitions, and they are often highly ephemeral. 'Structures' and 'boundaries' influence behaviour.
- Information technology application which defines and supports a particular view ('boundaries' or 'structures') is increasingly seen as no longer the sole domain of the Information Systems specialist 'designer', whose action is subsequently *used* by a third party: the third party 'end-user' consumers of information increasingly mediate directly the technologies. Therefore the analytical underpinning will need to focus on behavioural patterns and everyday utilisation, and the social 'constraints' on that action, rather than a justification of the 'design' or intervention.
- There has been the recognition that behavioural patterns act and interact with the formal, designed information systems; information consumption patterns are not necessarily the same as assumed in the formal 'design': 'what is', is not the same as what 'should be' (justified against a certain set of criteria).
- Where intervention is considered necessary, those involved in the practice of Information Systems (user or Information Systems specialist) need to be able to reflect on their motivations and assumptions and social 'constraints' (including 'structure' and 'boundary'). Further, an academic analysis particularly must consider both the construction process and

be reflective enough to consider the value laden and sectional self interests of such intervention.

In order to cope with the 'messiness' inherent in analysing and developing 'interventions' in the behaviours which are fundamental to the everyday practice, reflected in the above points, the discipline of Information Systems needs particularly clarity in reasoning and direction, and this is seen as the *raison d'être* of the current chapter. This presents a challenge to the discipline of Information Systems, and encompasses an agenda for future research and practice. The focus in the thesis has argued that technology increasingly offers the opportunity for innovation with information at the 'user' level (in Information Systems practice), though so far has been rather limited at an information level, due to social 'constraints' on action: in practice all we see are manipulations of the technology which do little innovating, but serve to preserve, uphold or defend the social structures. This necessitates a view of the discipline which encapsulates the need to reflect on everyday human constructions of structures and boundaries, the 'bureaucratic' and social constraints of the context on action (see chapter 6), and the need to base the education and learning function of the discipline of Information Systems in alternate philosophical paradigms than that which has been traditionally dominant. The research on the 'orientations' serves to demonstrate the behavioural patterns, and the need to question human assumptions, in everyday practice. It has been demonstrated that in each orientation, there are dubious assertions and reactions to everyday circumstances, and action is assumed to be 'rationalisable', though can, in each circumstance, be questioned.

The central contribution has been the behavioural taxonomy which has been termed the 'orientations'; it enables a practical analytical framework to help diagnose traditional roles, norms, beliefs and insecurities which impact on the everyday applications of the (user oriented) information technologies. It implies that 'informating the enterprise' (Zuboff 1988) cannot be wholly achievable without such a behavioural diagnosis, and this implies much greater emphasis on learning, reflection and change. The thesis has argued for a re-interpretation of Structuration Theory for application in the discipline of Information Systems (Chapter 6), having argued that it has been used ambiguously. Yet which ever theoretical constructs are used, they must be applied highly critically rather than as a prescriptive set of stages and steps, and be based on the critical reasoning processes of both observer and the observed. In practice, the analysis of the behaviours of those involved in

the application of the information technologies, the observer (consultant) and the observed (information consumers) become intertwined in a process of learning and critical reflection.

The remainder of this concluding chapter reflects on the experience and lessons for the discipline of Information Systems, based on the research undertaken. The first part takes the key assertions made in the thesis and focuses particularly on the failings of the discipline to embark on genuine debates which encompass everyday behaviours. This has resulted in the influx of alternative philosophical and practical approaches which, whilst having merit, also have certain limitations for the guidance of practice. Part 2 develops an analysis of the experience and lessons learned for research in the discipline of Information Systems. It does this by focusing on epistemology which moves beyond the incommensurability of the Burrell & Morgan (1979) model, by arguing for a learning approach, which encompasses the 'subjective'. Whilst the 'subjective' has difficulties in terms of construction, if combined with on-going learning, construction is not achieved by an 'impartial' observer (the traditional role of the Information Systems specialist), but by all those involved in Information Systems practice; 'practice' becomes seen as a 'process' of learning and reflection rather than a technologically designed 'end-state'. This leads into Part 3 which reflects on experience and lessons in Information Systems Practice, as one of developing the conditions in which critical reasoning and reflective practice (innovation) can flourish. This is seen as important for information management, as opposed to 'training on the technology', within the function of education and learning within the discipline of Information Systems. The need for a fresh impetus for reflective learning combined with information is seen in part as an explanation of the (rather confused) interest in what has become labelled 'Knowledge Management'.

1. EXPERIENCE AND LESSONS REGARDING THE NATURE OF THE DISCIPLINE OF INFORMATION SYSTEMS

The nature of the discipline remains ambiguous. The role of information systems, which forms part of study within the discipline has been defined as "*...a computer based organisational information system which provides information support for management activities and functions.*" (Ives *et al.*, 1980, p.910). Land 1986 and Earl & Hopwood 1987 see the information systems role as much wider and including the informal *and* formal nature of information utilisation, some of which may be mediated by computing technology. Keen 1980, on the other hand, sees information systems as the "*...study of effective design, delivery, and usage of information systems in*

organisations and society" (Keen, 1980, p.10). However, it has been argued that the role of information systems is much broader. As introduced in the early sections of the thesis, at a functional level, discipline Information Systems can be considered as being concerned with five functions: processing and usability, education and training, system development, the management of the above functions, and information systems strategy (Jayaratna 1994), of which Keen's definition is concerned with only the systems development function. Further, these definitions do not differentiate between information and information systems.

The dominant thinking of the information systems discipline are guided by systems concepts using ontological boundaries 'as given', and assume that large and stable teams are engaged in the delivery of database applications. Such developments are supported by mainly structured approaches which focus on rationalisation of data resources across organisational unit or function, and the role of the systems analyst whose role it is to 'discover' and construct the data model of the organisation (see Eva 1991 pp 116; Ashworth & Goodland 1990 pp 10; Cutts 1987 pp 23; Weaver 1993 pp 134). Ould 1992, 1993a, 1993b, 1995, Ould & Roberts 1987 articulate the principles of 'process' tools and techniques, and yet there is little that links these to ephemeral nature of boundary construction. Object orientated systems development as discussed by Booch (1994), Yourdon (1989) still feature the same dominant thinking of large stable units and departments for application development. In the late 1990's, there has been the development of the popularity of products such as SAP R/3, which promise to help standardise routine and formal practices across seemingly traditional or assumed boundaries. However, all of these development efforts are still characterised by the following:

- a regularity of task in the use of the end product data base;
- their fundamental objective is that of efficient data organisation;
- development is achieved by Information Systems specialists;
- the tools and techniques used are project based with a focus on efficient resource management;
- associated approaches and techniques are most appropriate in large organisations where disparate data sources are rationalised and consolidated;
- it assumes to operate within the security of large organisations with stable organisation structures.

There has been a realisation of the importance for organisations to consider future direction and environment as the basis for guiding their investments and activities. The strategic issues

have had an impact as the need for design of information systems to support organisation strategies. Consequently, Information Systems literature has focused on planning, competitive advantage and the 'strategic' nature of Information Technology investments (Somogyi & Galliers 1987), with the ultimate objective of reducing cost, risk and failure (see for example the 'evaluation' debates in Willcocks, 1994, Willcocks & Margetts 1994 and the risk analysis of Dhillon & Backhouse 1996). The 'strategic' nature of Information Technology is based in part on the natural transcendence of the use of such technology beyond that of the 'efficiency' savings: rather technology should be seen as increasing the 'effectiveness' of organisations. Most literature on information systems strategy take 'effectiveness' of information systems to mean its contribution profit maximisation and competitive advantage, thus emphasising the 'rationality' of models used and the purposeful and linear strategies in planning. However, they discuss very few ways of how 'effectiveness' can be achieved or measured in practice, and at the point of impact, and in its everyday application. In general, this literature is based on economics rather than the analysis of social behaviour and systems.

Thus, whilst recognising 'efficiency' and 'effectiveness' to be a useful heuristic, it tends to be couched in the language of economics: it is said that the information systems can add substantial value if the manager is aware of the contribution made in fitting or enhancing the 'efficiency' or 'effectiveness'. Most such analyses are based around frameworks of traditional corporate strategy and information systems specific frameworks: 'strategic' frameworks in information systems are commonly applied using (or derived from) the 'strategic grid' (McFarlan 1984), the 'stages of growth' framework (Nolan 1979), Critical Success Factor Analysis (Rockart 1979; Bullen and Rockart 1981; Shank *et al* 1985) or value chain analysis (Porter & Millar 1985; McFarlan & McKenney 1983; Ward & Griffiths 1996). The awareness of the importance of organisational strategies may have directed the prioritisation of information systems construction or refinement, and are used as 'ontologically objective', or within the 'ontological' systems paradigm. The result is that the Information Systems specialist still continues to have a predominant view of building rationalised data systems with efficiencies in mind. This points to a failure in the traditional view of the discipline to provide a set of concepts to guide the activities of the information systems specialist in a new environment.

These types of analysis are seen as 'classical' in their assumptions. They compliment the assumptions (as articulated in the above section) and ignore the ephemeral and changing

characteristics of everyday planning (for a complimentary discussion see Whittington 1993). They also ignore the everyday behavioural traits and the need for enhancing the 'process' of information utilisation (see also Ciborra 1991). More importantly, used simplistically, they may be used to justify action and keep the locus of decision making within one social grouping, and thus inhibiting the subjective transformation process and innovation to other of another social grouping.

Over simplistic usage of such models, or of models in traditional hard systems analysis such as those described in chapter 4, tends to make assumptions about organisations which do not explicitly question the ontological (knowledge 'as given') assumptions as described. Ironically perhaps such analyses exist at a time when much managerial literature have emphasised a new set of environmental circumstances. It is said to be a 'post-fordist' era, where customer expectations drive organisational form. Shorter lead times, flexibility, high aspirations of employees have been cited to result in new organisational forms which are seen as more responsive to environmental change (see Johnson & Scholes 1996). Older 'bureaucratic' organisation, based on formal hierarchy (Anthony 1965) is seen as increasingly less appropriate, and is reflected in aspects of the Business Process Re-engineering literature (see for example Harrington, HJ (1991), Davenport 1993, Hammer 1990; Hammer & Champy 1993). Outsourcing also reflects new debates regarding organisational form (see Ward, 1995). New organisational structures and forms are seen as attributable to a number of new environmental and economic pressures, and are rationalised against such pressures. Indeed, the well defined and highly demarcated roles and responsibilities, that were once a key assumption within the hierarchic and bureaucratic form, it has been claimed, has been somewhat eroded by new flexibility, flattened organisation structure as well as the 'empowered' workforce (see also Ezzamel *et al* 1994) and 'process oriented' teams. Key roles of technology as a method of 'automation' have been replaced by its 'informing' role (Zuboff 1988, 1994) and by change which is constant, in method and structure of work practices and systems, both within and across traditional organisation boundaries. A time when old 'knowledge as given' needs to be challenged perhaps?

The above represent some of the key dimensions and thrusts of Information Systems research but, whilst exploring the role of technology, many analyses fail to question some of the key assumptions being made in the field. However, the conclusions being drawn here in this thesis are commensurate with other writers in the field. For instance Ciborra 1997, p. 1554 concludes that:

'Strategic alignment is defined as the inherently dynamic fit between external and internal business domains, such as the product/market, strategy, administrative structures, business processes and IT. Economic performance is enhanced by finding the right fit between external positioning and internal arrangement. Research on strategic alignment has drawn a badly needed line between strategy, IT master plans and business processes and structures.

Despite the wide diffusion of strategic alignment as a buzzword, elsewhere I claim that the research program that pursues this concept is lacking, if not bankrupt.'

The realisation of the failure of some aspects of the discipline of Information Systems has invited a number of researchers from other disciplines to bring alternative philosophical paradigms, as a way of bridging the gap. Walsham (1993a) uses the principle dichotomy of formal 'structural' forms in information utilisation within organisation, and the informal everyday behaviour. Given the dynamics of organisation structural form (see Harrington, J. (1991)), there seems to be increasing debate regarding the epistemological sources of structure. Walsham (1993a) has attempted to influence the thinking of Information Systems using Structuration Theory, and this also has been used in this thesis. The use of Giddens's Structuration Theory, however, as has been argued in chapter 6, has been used somewhat selectively both in current Information Systems research and in the wider management literature (see also Whittington 1992, 1993, Kawalek 1997b), and by itself has not been sufficient to influence the practice of the Information Systems field. This is because: (i) Giddens's work tends to be somewhat ambiguous in terms of how research is actually undertaken: is it from an analysis on the one hand of mental constructs and structures of the observed or is it, on the other hand, developed from the study of the economic and social context of the traditional historical-materialist tradition? The latter follows Giddens's own progression of thought (Giddens 1971, 1973, 1974, 1976, 1977, 1979, 1981, 1984, 1985a, 1985b, 1990, 1991, 1994). The danger with the latter is that structural form might be accused of being a construction of the observer, not of the observed. (ii) Walsham (1993a) has not demonstrated a wholly practical alternative in his approach to the use of Structuration Theory. It accepts 'interpretation' as a subjective account and does not enable a practical approach to 'construction'. This is a particularly difficult question, as construction is usually associated with the 'objective' ontological position, and often seen as an 'epistemic privilege' of the observer, justified by the method used (see Kitsuse & Cicourel 1963). However, this position is not entirely tenable, because of the imperfections of any one method. Thus the need to use method as a learning device, both by the observer (method user) and the

subjects. In a rather similar way as developed in Checkland 1985, this thesis argues that this should be dealt with by a reflective learning approach of observer and observed. It is a position which is similar to that of the 'reflective practitioner' (Shön 1995), and the philosophical basis is outlined in the following section. It enables the maintenance of subjectivism in an ontological sense, and creates it through the subjective phenomenological constructions of the subjects, which is challenged as part of an on-going learning approach. Change is thus constant, but enables the realisation of the subjective knowledge development. By appealing to the subjective, it does not mean that action cannot be 'constructed', but in the construction, there is critical debate by participants of IS practice (in this case, users and Information Systems specialists): the 'expertise' and 'scientific rationalism' which tends to dominate the Information Systems discipline, is also subjected to critical reflection. The argument is not to negate the value of bringing technology and information, systems or strategic concepts: but, where there is knowledge, there also needs to be a genuine dialogue wherein those involved in practice can learn together to apply partial knowledge to perceived problem situations. This is justified further in the following section. However, writers who have embraced subjectivism, tend to be unclear on the rather thorny (in a philosophical sense) of 'construction'. It is not confined to writers who advocate 'interpretive' approaches. Other writers have attempted to bring Critical Social Theory as a philosophy to replace the use of 'systems'. They too have not provided practical alternatives for guiding information systems practice, (see chapter 2), and this is critiqued at a philosophical level in the following section. Whilst there is an appreciation by many information systems specialists that they need a different set of paradigms to guide their activities, in the absence of practical help, they have resorted to use traditional development methods and 'common sense' adjustments and the use of method as a 'social defence' (Wastell 1996). This also may explain the attempts to link 'soft' systems methods and 'hard' approaches such as SSADM. Therefore, if any philosophy is to be useful to the field of information systems, those who are advocating new paradigms, must also demonstrate their relevance to understanding and to deliver changes in practice that are in tune with the changing forms of organisation and technology, their interactions with the environment and behaviour.

2. EXPERIENCE AND LESSONS FOR RESEARCH IN INFORMATION SYSTEMS

The problems with the 'objective' analyses is that they do not focus on the power, control, bureaucratic and social 'constraints' that surrounds information and associated technology utilisation (Kawalek & Hackney 1998a). This emphasises the role of the social process and conflict, and the meaning attachment as primary explanation for a particular strategic outcome, and that issues can only be investigated by investigating the phenomenological constructions of the subjects (those involved in everyday practice). When developing an argument over 'effectiveness', there needs also to follow an analysis of 'effectiveness for whom' and the social constructions of those involved. Also, human perceptions of information need are 'constrained' by a variety of social factors, as is their ability to take action. In this way, information cannot be seen as 'objective' and serving generic organisational or societal interests. Rather it reflects complex social processes which are, as has been argued, not only derived from narrowly defined organisationally based criteria's, but often on a wider social, cultural and/or historical alignment. The information component of information systems cannot be seen in this 'objective' perspective, nor can the issues around the management of that information. Whilst some of the 'designs' of information systems have *assumed* a certain objectivity in regulating many aspects of human activity (see Rose & Millar 1992; Knights and Willmott 1993), it tends to have legitimation and justification because it sometimes masquerades the social sectional interests as enhancing 'efficiency' and 'rationalisation'.

This is true of the 'empowered' information worker also, who often acts to 'enhance' his/her own information environment by directly manipulating varied technologies, without the direct intervention of the Information Systems specialist. Such applications are often seen as 'less controllable', which leads to claims that it is inferior and lacking in standards (see Mason & Willcocks 1991). There is little doubting the truth of this, but it is not just a technical or software problem, but an information one and therefore a social one also. Users use information to meet personal goals, which *sometimes* (arguably) fit wider sectional, departmental or organisation goals. 'Users' are rarely 'subversives' however, (even though they are sometimes treated as being). These 'users' are involved in Information Systems practice and 'diversity' can be seen as contributing to innovation. Yet it is also recognised that 'users' also appeal to 'rationalisations' which are socially constrained by their lack of critical awareness, and as shown, are often motivated to further their own personal or narrow

sectional interests; further, even where there are the best of intentions, they are often lacking in vision, and innovations, where they occur, are rather stumbled upon and not recognised as being.

What seems perfectly 'rational' to one involved in the practice of Information Systems, is rather 'irrational' to another. Whilst 'rationality' is important, without critical understanding, it can be naïve: an academic account within the discipline of Information Systems which is considering the everyday practice, must consider the social construction and the reasons for it, in order to be able to discover richer understanding. If a behaviour based analysis is taken, it follows that information utilisation (and thus the technology used to deliver it) cannot be seen as divorced from sectional or self - interest (see also Stamp 1969; Sterling 1979). In general 'justifications' of applications of any sort is commonly to present the discipline as an 'objective' design and commonly backs up or strengthens the formal hierarchical, power and bureaucratic forms, which fail to question based on a 'rational scientism' similar in epistemic assumption to the scientific management movement (Taylor 1947). Because the discipline and practice are sometimes muddled, justification of any 'system' or application is therefore couched in theory-neutral observational language, which is crucial to a positivistic research programme: as Hindess 1977, p. 18 points out:

'... it makes possible a very precise conception of the testing of theory against observation. The testing of theory against irreducible statements of observation is equivalent to a direct comparison between theory and the real. If they fail to correspond then the theory is false and therefore may be rejected.'

It is in this way that the field of information systems can sometimes masquerade as somehow representing the 'objective' and ignores the social, behavioural and sectional interest aspects of context, and this represents a cosy over-simplification. Whilst those in the practice of Information Systems may ignore this, academic analyses cannot.

Yet there remains some key issues if a 'subjective' stance is taken. This is to do with the 'relativism' which the 'subjective', commonly referred to when utilising the Burrell & Morgan (1979) model. This question goes to the heart of the incommensurability debate (Jackson & Carter (1991, 1993); Willmott (1990, 1993a, 1993b); Allen & Ellis (1997), Bernstein 1983, 1988). Whilst accepting the 'subjectivity' of everyday affairs, how can it be that we can come to some sensible analysis of any one situation and give some purpose, direction and

legitimacy in any managerial intervention or analysis of behavioural pattern? The following discussion develops on the ‘construction’ problem as introduced in chapter 2.

Objections to the ‘objective’ have resulted in the discipline of Information Systems embracing alternative accounts. One such account for instance, has been termed ‘radical accounts’ (Alvesson & Willmott 1996 p. 145). In such accounts information systems would perhaps present information as purveyor of a certain organisational reality, and thus constraining the members’ perceptions of events and realities, and thus visibility is limited by the scope of ‘...conversation to those phenomena we have metaphorically permitted’ (Dillard & Nehmer 1990, p. 32). Alternative perspectives are somewhat limited, hidden and excluded by ‘primary’ theoretical categories (Lehman and Tinker 1987, p. 576). Thus the organisational reality depicted by the information system reflect the bureaucratic form of organisation *and* society (Whittington 1992, 1993; Kawalek 1997b). This perspective would argue that the information contexts are related to the socio-historical contexts of its production and tends to operationalise the economic and social interests hegemonic in any particular historical period. This perspective would argue that this tends to remain hidden by a front of ‘objectivity’ (see also Cooper 1983; Tinker 1991).

By aligning the historical account of social roles and norms, the position described would tend to avoid the subjective-objective dualism described by Burrell & Morgan (1979). By a focus on the way humans make representations of the real world within context, then knowledge becomes in some way ‘external’. This is obviously an anti-positivist position, by emphasising the role of the individual in projecting sets of assumptions and constructions which acts to create their own realities, which is constructed dependent on their background cognitions which are necessarily associated with social experience. This presents a key problem for ‘interpretive’ philosophies which depend on a sort of representational language, in which the “facts” are discovered. From this perspective, empirical accounts tend to be criticised because they tend to take a ‘legitimate’ perspective which are ultimately partisan, no matter how in-depth the empirical observation. This is commented upon, in chapter 3 whilst attempting to operationalise the Grounded Theory of Glaser & Strauss (1967), and in the content analyses. Of particular importance here is the perspective that some Information Systems literature have in creating a role akin to a sort of neutral arbiter underpinned by organisational rationality, hiding their own political perspectives and motives which are promoted as standing back away from the socio-historical contexts in which they were created. For instance by applying uncritically the strategic models or Information and

Workflow Analysis techniques (chapter 4). This perspective is commensurate with radical view in accounting practice: "...the accountant emerges as a worthy under-labourer, a 'worker' and perhaps an expert in technical niceties but with no pretence to pass value judgements on the goals of decision-making. His or her role is neutrally facilitative..." (Power & Laughlin 1992, p. 115). Information Systems practice can assume a similarly objective role.

Despite explanatory power, however, there are still problems with this 'radical' account. Since all knowledge is socially constructed, then it seems difficult to heighten one perspective over another. Thus a single perspective cannot justify itself. This makes picking through a key issue lapse into incoherence as it is bound by its socio-historic construction and remains a purely subjective and relativist perspective, which is in a sense destructive of its own perspective. Furthermore, if such a position was considered the 'correct' epistemological position, then it tends ironically perhaps, to deny the basis for disagreement. In effect it becomes 'elitist': those who use it become some sort of adjudicator.

3. EXPERIENCE AND LESSONS FOR THE PRACTICE OF INFORMATION SYSTEMS

The problems of the 'subjective', has been the subject of a great deal of philosophical debate (see Bhaskar 1978, Sayer 1984). Following Johnson 1995 (after Freire 1972a, 1972b, Freire and Shor 1987, Freire 1973, 1974), it is proposed that Information Systems practice deal with it as one of learning and reflection. See also the 'learning' approach in Checkland (1985). This implies learning on the part of those involved in the practice, and involves genuine debate and critical reflection on knowledge development.

Learning may be seen as factual knowledge as 'given', derived from a given scientific method, and imparted on a subject. However, in the practice of Information Systems, the subjects (users and Information Systems specialists) need also to be given the ability to reflect on their own social situation, and the 'constraints' on action, and assistance in understanding and articulating their particular motivations and objectives. This is a critical reflective process, and is rather different from the notions of 'training on the technology' which is dominant in the education and learning function within the discipline of Information Systems. It involves the development of the conceptual reasoning processes of the Information Systems specialist, and the users. This is seen to be achieved by shifts in systems as well as social thinking.

TOWARDS LEARNING IN SYSTEMS THINKING

For instance 'Systems' that have been used in traditional mode, which has guided information systems specialists for decades, have been based on 'ontological mode', ie taken as given knowledge. Such a mode makes the information systems specialist operate as if there are 'systems' are to be found in the world. In this sense, when a system is taken 'as given', the concentration of the information systems specialist is the 'content' of that system. The effort then is directed to the improvement, re-design or construction of the components of that 'system'. This in part may help to explain the continuing pre-occupation of the desire to build and maintain 'efficiency' as a primary goal, but to also incorporate all information systems activities within this whole - hence efforts at centralisation. The dominant mindset tends not to comprehend information processing or storage activities beyond their control as having any value. It results in the focus on task and process, devoid of critical questioning, and avoids the difficult issues of heightening the phenomenological constructions of people involved in the practice of Information Systems.

In soft systems approaches 'systems' are taken as a set of concepts to guide the construction of boundaries. Using this approach there are no systems to be found in the world. 'Systems' become constructs to structure one's thinking about the world. Therefore concentration of the information systems specialist is on 'content' of boundaries that are created. Instead of the concentration on the content improvement, the shift enables the information systems specialist to consider the most appropriate point to draw the boundary, and to consider the rationale, objectives and implications of drawing the boundaries in the first place.

For example, in the 'ontological mode' of systems, users are 'outside' interacting with the system, whereas in 'epistemological mode', users can be considered as part of a system to be designed. This means that the information systems specialist will automatically consider the mind-set of the user when considering design or measuring effectiveness. See Nissen (1997). Checkland (1981) and Checkland & Scholes (1990) who provide a practical way of using such epistemological modes of 'systems' in the designs of organisational solutions. The refinement of methodology is based on over 500 practical applications within organisations. Its uses span marketing, production, and also information systems construction. See Checkland & Scholes (1991). The information systems specialist, however, must grasp the new mode of the use of 'systems' if they are to develop information systems to match new innovations and

organisational forms. Larrasquet (1995) discusses how this form of thinking can be used for developing object oriented databases, not on traditional lines, but as dynamic and atomic information systems cells, which can join or disperse in tune with changing organisation forms.

Despite such theoretical notions, there is little evidence to suggest that in the practice of Information Systems, such an approach is widely utilised. It would be an interesting rhetorical question to contemplate whether or not the discipline of Information Systems would have embraced the social and structural analyses (as in this thesis) if soft systems was more widely practised. It is however, in dealing with the subjective constructions and in dealing with the questioning of those constructions, where the conceptual reasoning processes seem to fail in some areas of the discipline and practice of Information Systems.

LEARNING IN SOCIAL THINKING

For Freire (1972a, 1972b, 1973, 1974) the process of education should be 'liberating' and that the necessary prerequisites for developing a 'critical consciousness' by a liberating and authentic dialogue of on-going learning and reflection. It means that the traditional education processes are overly 'passive' and assume that the learner absorbs concepts and constructions of the teacher, often alienating the learner by assuming the learner absorbs 'factual' knowledge, which is a form of social hegemony (see also Blauner 1964). This, argues Friere (1972a), tends not to *question* the social assumptions (such as the key constraints on action - 'structures' and 'boundaries') and associated vested interests. Rather, he proposes, that the educators role is "...to propose problems about the codified existential situations in order to help the learners arrive at an increasingly critical view of their [own] reality." (Freire 1972b, p. 36). The dialogue for education is therefore based not on factual knowledge, but on reflexivity on the learners own experiences: "...Such a programme is an educative and therapeutic catalyst because the intent is to engender, through reflection, new (theory-laden) self-understanding" (Johnson 1995, p. 501). There are a number of points that should be made here. Firstly, this is obviously an opportunity to widen debate regarding the method of learning and reflection in the discipline as well as the everyday practice of Information Systems: for far too long it has been built on techniques that can be 'perfected' but without reflective practice on the *meaning* of such techniques within context (organisational or social). Secondly, it provides an opportunity to move the debate around the Burrell & Morgan 1979 model away from some sort of baseline from which research is developed incommensurably, as being 'objective' or 'subjective' on

the one hand, or on the other, contexts characterised by 'conflict' or 'order'. Rather, the paradigm model itself becomes a heuristic to be used in learning and reflection, but no more. It is not a matter of being 'radical', or from the 'interpretive' tradition or 'positivist'; this has become a dominant paradigm which in itself becomes an 'iron cage' (see Weber 1947) which can restrict critical reasoning and consciousness, and acts only to divide the discipline of Information Systems. Thirdly, any incommensurable position without critical reasoning and without clarifying the value laden assumptions of action, without questioning, results in imperfect analyses and entails the "*introjection by the dominated of the cultural myths of the dominator*" Freire 1972b, p. 59. Fourthly, in order that individuals can gain greater reflectiveness, such an agenda must be initiated by the Information Systems research community. Lastly, in the everyday practice of Information Systems, this critical learning and questioning needs to feature more highly, in order that some of the 'constraining' social forces are questioned; that the Education and Learning function embrace the development of greater critical dialogue, rather than be focused on 'training on the technology'. This is seen as a pre-requisite for the development of innovative practice at the end-user level.

Thus the learning agenda proposed by this stance is one which can transform a social world which is central for knowledge. It is an agenda which is learner oriented;

'...it is inappropriate for a pedagog to attempt to deposit putatively privileged recipes of knowledge into a learner. Education must develop those subjects' ability to assess their circumstances through developing a self-conception in which they are epistemic subjects who are able to determine and change their situation, as opposed to powerless objects determined by an immutable situation.' (Johnson, 1995, p. 501).

It is an agenda where the Information Systems specialist "expert" may take on the role in the Education and Learning function of Information Systems as facilitator of self reflective learning of the subjects (which includes the Information Systems specialist), to develop new strategies and develop knowledge that is practical and adequate for resolving perceived problems, and by doing so, act as a catalyst of transformative dynamics. Reflection on the structural and bureaucratic 'constraints' is seen as part of that liberation, and epistemology returns to focus on the individual ontologies of the subject. Knowledge, which is the iterative result of reflection and education, determine an individuals' information need, patterns of usage and selection, and this in turn, determines the data (see figure 7.1).

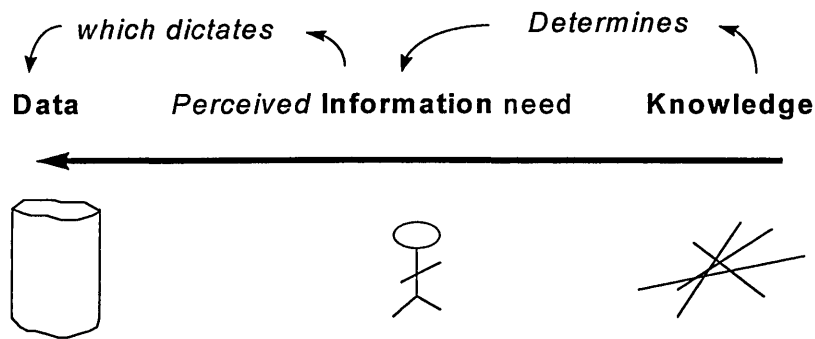


FIGURE 7.1: TURNING UPSIDE DOWN A COMMON ASSUMPTION IN INFORMATION SYSTEMS PRACTICE THAT DATA IS TRANSFORMED BY THE HUMAN AGENT INTO INFORMATION BY THE ATTACHEMENT OF MEANING, TO PRODUCE KNOWLEDGE.

4. IN SUMMARY: EXPERIENCES AND LESSONS IN USER INNOVATION IN THE DISCIPLINE OF INFORMATION SYSTEMS

'Modernity' in information systems is seen as a useful concept to the strong linkage between information and structural form. It is not a concept that is easily defined, and such definitions are of some debate. Giddens 1990, p.137-138 sees it as something

'...to which the bounds of rationality are drawn tighter and tighter, imprisoning us in a featureless cage of bureaucratic routine. Among the three founders of modern sociology, Weber saw most clearly the significance of expertise in modern social development and used it to outline a phenomenology of modernity. Everyday experience, according to Weber, retains its colour and spontaneity, but only on the perimeter of the "steel-hard" cage of bureaucratic rationality.'

Modernity in Information Systems is that which is concerned 'objectively' justifying 'design' of technology and organisation, imposition of control (often caricatured as a drive for efficiency, effectiveness and/or quality), denying individuals the ability to be reflective on their own motivations and justifications. This is true of the information Systems specialist, and of the end-user, both of whom are (in differing roles) practitioners of Information Systems. For instance, it encapsulates the over simplistic assumption of 'profit maximisation' - as if that is linear and simply achieved by application of the 'right' technology. 'Modernity' in the IS field, assumes that strategic fit models can provide an 'objective' model of the

'correct' system. It is indeed based on models of organisation, driven by functional models and/or economic justifications for action without consideration of the subjective motivations; it assumes that 'expertise' in the field is 'right' and correct, and is not socially value laden. These, as has been shown, can provoke behavioural reactions, and are not necessarily conducive to the promotion of trust or inclusion in some key decisions, or to reflection and learning to promote innovation with information, rather than 'defensive' or 'frustrated' reactions. It is not to say that the discipline cannot build on the concepts so far developed (for example strategic fit, models of human activity, or conflict type perspectives), but they should be also be *critically* appraised by subjective reflection by *both* observer and observed. This is somewhat commensurate with other conclusions (see Ciborra 1997). It is a position which at a theoretical level explores the possibility of transcending the Burrell & Morgan (1979) paradigm model, not by some sort of claim epistemic privilege; rather the epistemological position advocated is the reflective appeal of varied explanations as an enabling conceptual device focused on the 'observed'. As Sayer, 1984, p. 78 describes:

'...the world can only be understood in terms of the available conceptual resources, but the latter do not determine the structure of the world itself. And despite our entrapment within our conceptual schemes, it is still possible to differentiate between more and less practically adequate beliefs about the material world. Observation is neither theory-neutral nor theory determined but theory laden. Truth is neither absolute nor purely conventional and relative, but a matter of practical adequacy.'

Structure and bureaucratic form is questioned reflectively by exploring the individual ontologies of the observed (subjective), but the focus is on critical learning of the subject. This, it is asserted, opens the epistemic foundation of innovation in the practice of Information Systems, by transcending and 'liberating' the observed from structural constraints. In the practice of Information Systems, it is a position which argues that innovation comes from everyday practice; but without critical reflection, innovation will be confined to simplistic appeals to 'rationalism', and that is itself not conducive to in-depth and critical reasoning processes. This is a conclusion derived from the adoption of social theory, but one which is also complimented by the shift towards systems thinking in 'epistemological mode'.

To make this shift there are some broad challenges to the practice of management, and thus to the Management discipline. It represents the challenge of building a culture of learning and development. This requires critical reflection on the cultural norms and structures of

contexts (constraints on action). It involves building trust and empathy between social groupings, where education is not in a 'passive' state of imparting 'given' knowledge. It has been shown that this tends to justify managerial action couched in language of 'rationalism' backed up by appeals to scientism, and reflecting some sort of epistemic privilege. The challenge is to move beyond this approach, which only serves to stifle innovation and to stifle the generation of new knowledge and the fulfilment of humans in the workplace. This calls for greater action based research to demonstrate the impact of liberating thinking, and the assessment of its impact on innovation and knowledge generation. This is an important issue in the discipline of Management in general, but it is also of particular importance to the discipline of Information Systems, given the increasing availability and power of the technology.

BIBLIOGRAPHY

- Adam, F., (1997), Can social network analysis provide a new analytical approach for DSS development and DSS research?, *Proceedings of the 5th European Conference on Information Systems*, Cork, Ireland, 413-426.
- Agar, M.H., (1973), *Ripping and running: a formal ethnography of heroin addicts*, New York Seminar Press.
- Alavi, M., (1985), End User Computing: the MIS Manager's perspective, *Information and Management*, **12**, 2, 171-178.
- Allen, D. & Ellis, D., (1997), Beyond paradigm closure in information systems research: theoretical possibilities for pluralism, *Proceedings of the 5th European Conference on Information Systems*, Cork, Ireland, 737-759.
- Altheide, D.L., (1976), *Creating reality: how TV news distorts events*, Sage, CA.
- Altheide, D.L. & Johnson, J.M., (1994), *Criteria for assessing interpretive validity in qualitative research*, in Denzin, N.K. & Lincoln, Y. S., (1994), *Handbook of qualitative research*, Sage, London, 105-117.
- Alvesson, M. & Willmott, H., (1996), *Making Sense of Management: a Critical Introduction*, Sage
- Ang, J.S.K., (1993), Performance criteria of a sound office analysis methodology, *International Journal of Information Management*, **13**, 51-67.
- Ansoff, H.I., (1965), *Corporate Strategy*, Penguin, Harmondsworth.
- Ansoff, H.I., (1991), Critique of Henry Mintzberg's "The Design School", *Strategic Management Journal*, **12**, 449-61
- Ansoff, H.I., (1965), *Corporate Strategy*, Penguin, Harmondsworth.
- Ansoff, H.I., (1991), Critique of Henry Mintzberg's "The Design School", *Strategic Management Journal*, **12**, 449-61
- Anthony, R. N. (1965), *Planning and control systems : a framework for analysis*, Harvard University Graduate School of Business Administration.
- Armstrong, P., (1991), Contradictions and social dynamics in the capitalist agency relationship, *Accounting, organisations and society*, **16**, 1, 1-25.
- Arndt, J., (1985), The tyranny of paradigms: the case for paradigmatic pluralism in marketing, *Research in Marketing supplement*, **2**, 63-82.
- Ashworth, C. & Goodland, M., (1990), *SSADM: A practical approach*, McGraw-Hill, Maidenhead.

- Attewell, P. & Rule, J. (1984), Computing and organisations: what we know and what we don't know, *Communications of the ACM*, **27**, 12, 1184-92.
- Avison, D. E., Shah, H.U. & Golder, P.A., (1993), Tools for SSM: a justification a reply to critique of two contributions to soft systems methodology, *European Journal of Information Systems*, **2**(4), pp. 312-313.
- Baker R.L. (1994), *Networking the enterprise - how to build client/server systems that work*, McGraw-Hill.
- Bateson, G., (1971), *The cybernetics of 'self': a theory of alcoholism* in Bateson, G., (1973), *Steps to an ecology of mind*, Paladin, St Albans.
- Bannister, D., & Fransella, F., (1971), *Inquiring Man: The theory of personal constructs*, Penguin.
- Bannon, L., Bjorn-Anderson, N. & Due-Thomsen, B., (1988), *Computer support for co-operative work: an appraisal and critique*, in Bullinger, HJ., (ed), *Information technology for Organisational Systems*, North-Holland, Brussels.
- Barley, S.R., (1986), Technology as an occasion for structuring: evidence from observations of CT scanners and the social order of radiology departments, *Administrative Science Quarterly*, **31**, 78-108
- Beck, U., (1994), The reinvention of politics: Towards a theory of reflexive modernization, in Beck, U., Giddens, A. & Lash, S., (eds), *Reflexive modernization*, Polity Press, Cambridge.
- Becker, H.S., (1970), *Problems of inference and proof in participant observation*, in Filstead, W.J. (ed), *Qualitative Methodology*, Chicago, Markham.
- Bellamy Foster, J., (1994), Labour and monopoly capital twenty years after: an introduction, *Monthly Review*, **46**, 6, Nov. 1-13.
- Benbasat, I., Dexter, A.S., Drury, D.H. & Goldstein, R.C., (1984), A critique of the stage hypothesis: theory and empirical evidence, *Communications of the ACM*, **27**, 476-85.
- Benjamin, R.I., (1982), Information Technology in the 1990's: a long range planning scenario', *MIS Quarterly*, **6**, 11-31.
- Berger, P.L. & Luckmann, T., (1966), *The social construction of reality*, Doubleday, New York.
- Bernstein, R., (1983), *Beyond objectivism and relativism*, Basil Blackwell, Oxford.
- Bernstein, R., (1988), *Beyond objectivism and relativism*, University of Pennsylvania Press, Philadelphia.
- Bertalanffy, L. Von, (1968), *General system theory*, Braziller, New York.
- Bhaskar, R., (1978), *A realist theory of science*, Harvester, Brighton.
- Bhaskar, R. (1979) *The Possibility of Naturalism*, Harvester, Brighton
- Bickerton, M., & Siddiqi, J., (1992), The classification of requirements engineering engineering methods, *IEEE*, 182-186.

- Bjorn-Anderson, N. & Eason, K. (1980), *Myths and realities of information systems contributing to organisational rationality*, in Mowshowitz, A., (ed), *Human choice and computers*, North Holland, Amsterdam.
- Blaikie, N. (1993) *Approaches to Social Enquiry*, Polity Press, Cambridge.
- Blauner, R., (1964), *Alienation and Freedom*, University of Chicago Press, Chicago.
- Blumer, H., (1967), *Symbolic interactionism*, Prentice Hall, Englewood Cliffs.
- Bloor, M., (1978), On the analysis of observational data: a discussion of the worth and use of inductive techniques and respondent validation, *Sociology*, 12(3), p. 545-52.
- Bloor, D., (1991), *Knowledge and Social Imagery*, Routledge and Kegan Paul, London.
- Boddy, D. & Gunson, N., (1996), *Organisations in the network age*, Routledge, London.
- Boland, J.R. & Hirschheim, R.A., (1987), *Critical issues in information systems research*, Wiley, Chichester.
- Boland, R.L. (1985), *Phenomenology: a preferred approach to research on information systems*, in Mumford, E., Hirschheim, R., Fitzgerald, G. & Wood-Harper, T., (eds), *Research Methods in Information Systems*, Elsevier, Amsterdam.
- Boland, J.R., (1987), *The In-formation of Information Systems* in Boland, J.R. & Hirschheim, R.A., *Critical issues in information systems research*, Wiley.
- Booch, G., (1994), *Object oriented analysis and design with applications*, Benjamin Cummings Publishing Company, California.
- Boulding, K.E., (1956), General systems theory - the skeleton of science, *Management Science*, 2, 3.
- Braverman, H., (1974), *Labour and monopoly capital*, Monthly Review Press, New York.
- Bridges, W., (1994), The end of the job, *Fortune*, 19 September, 62-74.
- Briefs, U., Ciborra, C. & Schneider, I., (eds), (1983), *Systems design for, with and by the users*, North Holland, Amsterdam.
- Brown, A.D. (1992), Grounding soft systems research, *European Journal of Information Systems*, 1(6), 387-395.
- Brown, A.D. (1993), Soft systems methodology: a case for user-dependent methodology - a reply, *European Journal of Information Systems*, 2(4), pp. 309-311.
- Brueggen D. and Lee S., (1995), Distributed Database Systems - Accessing Data More efficiently, *Information Systems Management*, 12(2).
- Bryman, A., (1992), *Quantity and Quality in Social Research*, Routledge, London.

- Buchanan D & Boddy D (1992), *The Expertise of the Change Agent*, Prentice Hall, Hemel Hempstead.
- Buchanan, D, Boddy, D, and McCalman, J., (1988), *Getting in, getting out, and getting back*, in Bryman, A., (1988), *Doing Research in Organizations*, Routledge, London.
- Bullen, C V & Rockart, F (1981), A Primer on Critical Success Factors, *CISR*, 69, June.
- Burn, J. & Szeto, Colonel., (1997), Key influencers on the perceived importance of information systems management issues: a comparison of survey results in Hong Kong and the United Kingdom, *Proceedings of the Information Resources Management Association International Conference*, 283-288, Vancouver.
- Burrell, G., (1983), Systems thinking, systems practice: a review, *Journal of systems analysis*, 10, 121 - 129.
- Burrell, G. and Morgan, G. (1979), *Sociological paradigms and organisational analysis*, Heinemann, London.
- Butcher, H., (1997), Why don't managers use information? *Managing Information*, p. 29-30, May.
- Butterfield, H., (1949), *The origins of modern science*, Bell & Sons, London.
- Cash, J.I. (Jr), Eccles, R.G., Nohria, N. & Nolan, R., (1994), *Building the Information Age Organisation*, Irwin.
- CCTA (1990), *SSADM Version 4 Reference Manuals*, NCC Blackwell, Manchester.
- Checkland, P., (1981), *Systems thinking systems practice*, Wiley, Chichester.
- Checkland, P. (1982), Soft systems methodology as process: a reply to M.C.Jackson, *Journal of Applied Systems Analysis*, 9, 37-39.
- Checkland, P. (1983), OR and the systems movement: mappings and conflicts, *Journal of the Operational Research Society*, 34, 8, 661-675.
- Checkland, P. (1985), From optimising to learning : a development of systems thinking for the 1990's, *Journal of the Operational Research Society*, 36, 9, 757-767.
- Checkland, P. & Scholes, J., (1990) *Soft systems methodology in action*, Wiley, Chichester.
- Checkland, P., (1992), *Information systems and systems thinking: time to unite?* in Cotterman, W.W. & Senn, J.A., *Challenges and strategies for research in systems development*, Wiley, Chichester.
- Checkland, P. & Holwell, S.E., (1993), Information management and organisational process: an approach through soft systems methodology, *Journal of information systems*, 3, 3-16.
- Cheney, P.H., Mann, R.I., Amoroso, D.L., (1994), *Organisational factors affecting the success of end user computing*, in Galliers, R.D. & Baker, B.S.H., *Strategic Information Management*, Butterworth-Heinemann, Oxford.

- Chou, H-W (1996), An Exploratory Study On EUC Phenomena In Taiwan's Industry, *Proceedings of the Information Resource Management Association Conference*, Washington, May.
- Chua, W.F., (1986), Radical developments in accounting thought, *The Accounting Review*, **LXI**(4), pp. 601-632.
- Ciborra, C.U., (1991), From thinking to tinkering: the grassroots of strategic information systems, *Proceedings of the twelfth international conference on information systems*, New York, December.
- Ciborra, C.U., (1997), Crisis and foundation: an inquiry into the nature and limits of models and methods in the IS discipline, *Proceedings of the 5th European Conference on Information Systems*, 1549-1960.
- Cirourel, A.V., (1964), *Method and measurement in sociology*, Free Press, New York.
- Clark Jr, T.D. (1992) Corporate Systems Management: An Overview and Research Perspective. *Communications Of the ACM*, **35**, 2, 61-75.
- Codasyl (1979), The Codasyl End-User Facilities Committee Status Report, *Information and Management Two*, Amsterdam, 137-163.
- Cohen, P., (1968), *Modern social theory*, Heinemann, London.
- Cohen, I.J., (1989), *Structuration theory: Anthony Giddens and the Constitution of social life*, Macmillan, London.
- Comte, A., (1854), *System of positive polity*, Volumes 1-4.
- Cooper, D., (1983), Tidiness, Muddle and Things: Commonalities and Divergencies in Two Approaches to Management Accounting Research, *Accounting, Organisations and Society*, **8**, 2/3, 269-286.
- Cooper, R.B., (1988), Review of management information systems research: a management support emphasis, *Information Processing and Management*.
- Cooper, R. & Zmud, R., (1990), Information technology implementation research: a technological diffusion approach, *Management Science*, **36**, 2, 123-139.
- Coser, L.A., (1956), *The functions of social conflict*, Routledge, London.
- Craib, I., (1992), *Anthony Giddens*, Routledge, London.
- Crowston K. & Malone T.W. (1994), *Information Technology and the Corporation of the 1990's: Information Technology and Work Organisation*, Oxford University Press, 249-275.
- Culnan, M.J., (1983), Chauffeured versus end user access to commercial databases: the effects of task and individual differences, *MIS Quarterly*, March, 57-67
- Currie, W., (1995), *Management Strategy for I.T. An International perspective*, Pitman, London.
- Curtis, G., (1995), *Business Information Systems*, Addison-Wesley, Wokingham.

- Cutts, G., (1991), *Structured systems and design methodology*, second edition, Blackwell Scientific, London.
- Cyert, R.M. & March, J.G., (1963), *A behavioural theory of the firm*, Prentice Hall, Englewood Cliffs.
- Dahrendorf, R. (1959) *Class and class conflict in industrial society*, Routledge, London.
- Davenport, T.H. (1993) *Process innovation: re-engineering work through information technology*, Harvard Business Press, Boston.
- Davenport, T.H. and Short, J.E. (1990) The new industrial engineering: Information technology and business process redesign, *Sloan Management Review*, **31**, 4, Summer, 11-27.
- Dauids, A., (1992), *Practical information engineering: the management challenge*, Pitman, London.
- Davies, L. & Ledington, P., (1991), *Information in action: soft systems methodology*, Macmillan., Hampshire.
- De Carteret, C. & Vidgen, R., (1995), *Data modelling for information systems*, Pitman, London.
- Denzin, N.K. (1970), *The research act in sociology*, Aldine, Chicago.
- Denzin, N.K. & Lincoln, Y. S., (1994), *Handbook of qualitative research*, Sage, London.
- Dillard, J.F. & Nehmer, R.A., (1990), Metaphorical Marginalisation, *Critical Perspectives on Accounting*, **1**, 1, 31-52.
- Dhillon, G., (1995), *Interpreting the management of information systems security*, Phd thesis, London School of Economics, University of London.
- Dhillon, G. & Backhouse, J., (1996), Risks in the use of information technology within organisations, *International Journal of Information Management*, **16**, 1, 65-74.
- Donaldson, L., (1985), *In defence of organisation theory*, Cambridge University Press, Cambridge.
- Douglas, J.D., (1976), *Investigative social research: individual and team field research*, Sage, London.
- Drucker, P., (1974), *Management*, Heinnemann, London.
- Drucker, P., (1988), The coming of the new organisation, *Harvard Business Review*, Jan-Feb, 45-53.
- Drucker, P., (1997), The shape of things to come, An interview with Peter Drucker, *Leaders magazine Yritystalous* 3/97, Rastor Julkaisut, Helsinki, pp. 78-82.
- Dunn, W.N. & Swierczek, F.W., (1977), Planned Organisational Change: towards grounded theory, *The journal of applied behavioural science*, 135-157.
- Dutton, J.E. & Dukerich, J.M., (1991), Keeping an eye on the mirror: image and identity in organisational adaptation, *Academy of Management Journal*, 517-554
- Earl, M (1989), *Management IT Strategies*, Prentice Hall, Hemel Hempstead.

- Earl, M.J. & Hopwood, A.G., (1987), *From management information to information management*, in Somogyi, E.K. & Galliers, R.D., *Towards strategic information systems*, Abacus Press.
- Earl, M. & Runge, D., (1987), *Using telecommunications based information systems for competitive advantage*, Oxford Institute of Information Management Research and Discussion Papers RPD87/1, Templeton College, Oxford.
- Easterby-Smith, M, Thorpe, R, and Lowe, A (1991) *Management Research: An Introduction*, Sage, London
- Edwards, C., Ward, J. & Bytheway, A., (1991), *The essence of information systems*, Prentice Hall, Hemel Hempstead.
- Ehn, P., (1988), Work centred design of computer artefacts, PhD dissertation, Umea University, Department of Information Processing, Arbetslivscentrum.
- Eisenhardt, K.M., (1989), Building theories from case study research, *Academy of Management Journal*, pp. 532-550.
- Elton, G.R., (1984), *The practice of history*, Flamingo
- Eva, M., (1991), *SSADM version 4: A user's guide*, McGraw-Hill, London.
- Ezzamel, M., Lilley, S., Willmott., (1994), The 'new organisation' and the 'new managerial work', *European Management Journal*, 12, 4, 454-461.
- Fogel, R.W. & Elton, G.R., (1983), Which road to the past? : two views of history, Yale University Press.
- Foster, H., (1985), *Postmodernism: a preface* in Foster, H., (1985), (ed), *Postmodern culture*, Pluto, London, pp. ix-xvi.
- Friedman, A., (1994), The stages model and the phases of the IS field, *Journal of Information Technology*, 9, 137-148.
- Friere, P., (1972a), *Pedagogy of the oppressed*, Penguin, Harmondsworth.
- Friere, P., (1972b), *Cultural Action for freedom*, Penguin, Harmondsworth.
- Freire, P., (1973), *Education for critical consciousness*, Sheed & Ward, London.
- Freire, P., (1974), *Education: the practice of freedom*, Writers and readers publishing cooperative, London.
- Freire, P., (1978), *Pedagogy in process: the letters to Guinea-Bissau*, Writers and readers publishing cooperative, London.
- Freire, P., (1985), *The politics of education: culture, power and liberation*, Bergin & Garvey, London.
- Freire, P. & Shor, I., (1987), *A pedagogy for liberation*, Macmillan, Hants.

- Eden, C., (1992), Strategy development as a social process, *Journal of Management Studies*, 29(6), p. 799-811
- Gadamer, H.G. (1975) *Truth and method*, Sheed & Ward, London.
- Garnsey, E.W., (1990), *More on structure and agency: a note on the problems of analysing technology in the context of a social system*, Management Studies Group, Cambridge University.
- Galliers, R.D., (1991), Strategic information systems planning: myths, reality and guidelines for successful implementation, *European Journal of Information Systems*, 1, 55-64.
- Galliers, R.D., (1993), Research issues in information systems, *Journal of information technology*, 8, 92-98
- Galliers, R.D. & Baker, B.S.H., (1994), *Strategic Information Management: Challenges and strategies in managing information systems*, Butterworth-Heinemann, Oxford.
- Galliers, R.D. & Sutherland, A.R., (1991), Information systems management and strategy formulation: the 'stages of growth' model revisited, *Journal of Information Systems*, 1, 89-114.
- Galliers, R.D., Swatman, P.M.C. & Swatman, P.A., (1995), Strategic information systems planning: deriving comparative advantage from EDI, *Journal of Information Technology*, 10, 149-157.
- Ganz, J. (1993) Surviving the re-engineering revolution, *Networking Management*, January, 17-24.
- Garfinkel, H., (1967a), *The rational properties of rational and common sense activities* in Garfinkel, H, (ed), *Studies in ethnomethodology*, Prentice Hall, Englewood Cliffs, New York.
- Garfinkel, H., (1967b), *Studies in ethnomethodology*, Prentice Hall, Englewood Cliffs, New York.
- Garfinkel, H., (1988), Evidence for locally produced, naturally accountable phenomena of order, logic, reason, meaning, method etc. in and as quiddity of immortal ordinary society (I of IV): An announcement of studies, *Sociological Theory*, 6, 103-109.
- Garfinkel, H. & Sacks, H., (1970), *On the formal structure of practical actions* in McKinney, J.C. & Tiryakian, E.A., (eds), *Theoretical Sociology*, pp 339-366, Appleton-Century-Crofts, New York.
- Gibson, C.F. & Nolan, R., (1974), Managing the four stages of EDP growth, *Harvard Business Review*, January-February, pp. 76- ???.
- Giddens, A., (1971), *Capitalism and modern social theory*, University Press, Cambridge
- Giddens, A., (1973), *The class structure of advanced societies*, Hutchinson, London
- Giddens, A., (1974), *Positivism and sociology*, Heinemann, London
- Giddens, A., (1976), *New rules of sociological method*, Hutchinson, London
- Giddens, A., (1977), *Studies in social and political theory*, Hutchinson, London

- Giddens, A., (1979), *Central problems in social theory: action, structure and contradictions in social analysis*, Macmillan, London
- Giddens, A., (1981), *A contemporary critique of Historical Materialism*, Macmillan, London.
- Giddens, A., (1984), *The constitution of society*, Polity Press, Cambridge
- Giddens, A., (1985a) *The nation state and violence*, Polity Press, Cambridge
- Giddens, A., (1985b) Marx's correct views on everything, *Theory and society*, **14**, pp. 67-74
- Giddens, A., (1990) *The consequences of modernity*, Polity Press, Cambridge
- Giddens, A., (1991) *Modernity and self-identity*, Polity Press, Cambridge
- Giddens, A., (1994), *Living in a post traditional society*, in Beck, U., Giddens, A. & Lash, S., (eds), *Reflexive modernization*, Polity Press, Cambridge.
- Gladstone, W., & Murray, P.W. (1998), Debunking the complexity complex: a new look at the business environment, working paper, Sheffield Business School.
- Glaser & Strauss (1967), *The discovery of grounded theory*, Aldine.
- Glaser, B., (1978), *Theoretical sensitivity*, Sociological Press, California.
- Goffman, E., (1972), *Interaction ritual*, Penguin, Harmondsworth.
- Goguen, J., (1992), The dry and the wet, in Falkenburg, E., Rolland, C. & El-Sayed, N., (eds), Information systems concepts, *Proceedings of the IFIP Working Group 8.1 Conference*, Alexandria, Egypt, pp. 1-17
- Goguen, J., (1994), Requirement Engineering as the reconciliation of social and technical issues, in Jirotko, M. & Goguen, J., (eds), *Requirements Engineering: social and technical issues*, pp. 165-200, Academic Press, London.
- Gower, D. & Legge, K., (1988), Personnel and paradigms: four perspectives on the future, *Industrial Relations Journal*, pp. 225-235.
- Grant, R.M., (1991), *The resource based theory of competitive advantage: implications for strategy formulation*, California Management Review, 33(3), p. 114-122
- Greenbaum, J. & Kyng, M., (eds), (1991), *Design at Work*, Erlbaum Associates, Hillsdale NJ.
- Greenbaum, J., (1994), The Forest and the Trees, *Monthly Review*, **46**(6), Nov 1994, pp. 60-70.
- Grosvenor, J.B.M. (1994), *Mainframe downsizing to upsize your business*, Hewlett-Packard Professional books.
- Guba, G. & Lincoln, Y.S., (1994), *Competing Paradigms in qualitative research*, in Denzin, N.K. & Lincoln, Y. S., (1994), *Handbook of qualitative research*, Sage, London, pp. 105-117.
- Gunton, T (1988), *End User Focus*, Prentice Hall, Hemel-Hempstead.

- Habermas, J., (1972), *Knowledge and human interests*, Heinemann, London.
- Habermas, J., (1974). *Theory and practice*, Heinemann, London.
- Hackney, R A, (1994), *The Role of the Information Systems Function within UK Local Government: an interpretive analysis of the management of change*, Doctoral Thesis, Cranfield School of Management.
- Hackney, R A (1996), *Sustaining an IS Strategy in the Public Sector: a congruence of agenda model*, UK Academy of Information Systems Conference, Cranfield, April
- Hackathorn R.D. (1993), *Enterprise Database Connectivity - The Key to Enterprise Applications on the Desktop*, John Wiley & Sons
- Hammer, M. (1990) Re-engineering work: Don't automate, obliterate, *Harvard Business Review*, July-August, 104-112.
- Hammer, M. and Champy, J. (1993) *Re-engineering the corporation: A Manifesto for business revolution*, Harper business, New York.
- Hammersley, M., (1992), *What's wrong with ethnography? Methodological explorations*, Routledge, London.
- Hammersley, M. & Atkinson, P., (1983), *Ethnography: principles in practice*, Tavistock, London.
- Handy, C., (1997), The citizen corporation, *Harvard business Review*, September-October.
- Hanson, N.R., (1965), *Patterns of discovery*, Cambridge.
- Hannan, M.T. & Freeman, J., (1988), *Organisational Ecology*, Harvard University Press, Cambridge, MA.
- Harrington, J. (1991), *The Organisational structure and information technology*, Prentice Hall,
- Harrington, H.J. (1991) *Business process improvement: the breakthrough strategy for total quality, productivity and effectiveness*, MacGraw-Hill, New York.
- Heidegger, M. (1962) *Being & time*, Harper & Row, New York.
- Hassard, J., (1990), *An alternative to paradigm incommensurability in organisation theory* in Hassard, J. & Pym, D. (eds), *The theory and philosophy of organisations*, p. 97-108, Routledge, London.
- Hesse, E., (1980), *Revolutions and reconstructions in the philosophy of science*, Indiana University Press, Bloomington
- Heritage, J. (1984), *Garfinkel and Ethnomethodology*, Polity, Cambridge.
- Heygate, R. (1993) Immoderate redesign, *The McKinsey Quarterly*, 1, 73-87.
- Hicks, J.O., (1993), *Management Information Systems: A user perspective*, West Publishing Company, St Paul
- Hindess, B., (1977), *Philosophy and methodology in social science*, Harvester, Hassocks.

- Hirschheim, R., (1986), The effect of a-priori views on the social implications of computing: the case of office automation, *ACM Computing Surveys*, 18(2), pp. 165-95.
- Hirschheim, R. & Klein, H., (1989), Four paradigms of information systems development, *Communications of the ACM*, 27(11), pp. 1199-1216.
- Hochstrasser, B., (1994), Justifying IT Investments in Willcocks, L., *Information Management. The evaluation of information systems investments*, Chapman & Hall, London, pp. 151-165.
- Hochstrasser, B. & Griffiths, C., (1991), *Controlling IT investment*, Chapman & Hall, London.
- Holstein, J.A. & Gubrium, J.F., (1994), *Phenomenology, ethnomethodology and interpretive practice*, in Denzin, N.K. & Lincoln, Y., (1994), *Handbook of qualitative research*, Sage, London, pp 262-272.
- Hopper, T. & Powell, A., (1985), Making sense of the research into the social and organisational aspects of management accounting: a review of its underlying assumptions, *Journal of Management Studies*, 22(5), pp. 429-465
- Huff, S.L., Munro, M.C. & Martin, B.H., (1988), Growth stages of end-user computing, *Communications of the ACM*, 31(5), pp. 542-550.
- Hyman, R., (1987), Strategy or structure? Capital, labour and control, *Work Employment and Society*, 1, 1, pp. 25-55.
- IBM (1981), *Information Systems Planning Guide*, Business Systems Planning, 3rd Ed
- IOPener, (1992), Volume 1, Number 5, November.
- Ives, B., Hamilton, S. & Davis, G., (1980), A framework for research in computer based Management information systems, *Management Science*, 26(9), 910 - 34.
- Jackson, M., (1982), The nature of "soft" systems thinking: the work of Churchman, Ackoff and Checkland, *Journal of Applied Systems Analysis*, 9, 17-39.
- Jackson, N. & Carter, P., (1991), *In defence of paradigm incommensurability*, *Organisation Studies*, 12, 1, 109-127.
- Jackson, N. & Carter, P., (1993), 'Paradigm wars': A response to Hugh Willmott, *Organisation Studies*, 14, 5, 721-725.
- Jayaratna, N., (1990), Systems Analysis: the need for better understanding, *International Journal of Management*, 10, pp 228-234.
- Jayaratna, N., (1994), Understanding and evaluating methodologies: Nimsad, a systematic framework, McGraw Hill, Maidenhead.
- Jayasuriya, R., (1993), Stage of growth in end-user computing: applications in the health sector of developing countries in Asia-Pacific, *Journal of Information Technology*, 8, 151-159.
- Jenkins, A.M., (1985), *Research methodologies and MIS research*, in Mumford, E., Hirschheim, R., Fitzgerald, G. & Wood-Harper, A.T., *Research methods in information systems*, Elsevier, North Holland.

- Jenkins, K., (1995), *On 'what is history?', from Carr and Elton to Rorty and White*, Routledge
- Johansson, H.J., Mchugh, P., Pendlebury, A.J. & Wheeler III, WA., (1993), *Business Process Re-engineering : breakpoint strategies for market dominance*, Wiley, Chichester.
- Johnson, P., (1995), *Towards and epistemology for radical accounting: beyond objectivism and relativism*, *Critical perspectives on Accounting*, 6, 485-509.
- Johnson G., & Scholes K. (1989), *Exploring Corporate Strategy*, Prentice Hall.
- Jones, B., and Worsdale, G. (1993) Can IT help in working for patients?, *Health Services Management*, February, 13-16.
- Jones, O., (1997), The structuration of technology transfer: towards a social theory of innovation, Aston Business School Research Institute, Birmingham, UK.
- Kanter, R., (1989), The new managerial work, *Harvard Business Review*, Nov-Dec., 85-92.
- Katzenbach, J.R. and Smith D.K. (1991), *The wisdom of teams: Creating the high performance organisation*, Harvard Business School Press, Boston, MA.
- Kawalek, J.,(1994), Interpreting Business Process Re-engineering on organisation workflow, *Journal of Information Technology*, Volume 9, Number 4.
- Kawalek, J.P., (1996), Modelling information processes and flows: for specification or for learning?, *4th Annual Conference of the CFP-BCS on IS Methodologies*, Cork, Ireland, September.
- Kawalek, J.P., Hackney, R., & Dhillon, G., (1997a), Strategic information systems planning: perspectives on the 'end-user' revisited, *Information Resource Management Association Conference*, Vancouver, Canada, May.
- Kawalek, J.P., (1997b), Operationalising Giddens in Informaiton Systems Strategy, *European Conference in Information Systems*, Cork, Ireland, June.
- Kawalek, JP, Hackney, R., & Dhillon, G., (1997c), Information Technology and Communications Management within SME's: opportunities for partnerships, *United Kingdom Academy of Information Systems*, Southampton University, April.
- Kawalek, JP, Jayaratna, N., Larrasquet, JM., (1997d), The need for a change in the information systems specialists' conceptual reasoning, *Projectics Conference*, Bayonne, France, December.
- Kawalek, J.P. & Hackney, R., (1998a), Power & conflict in IS Strategy: Operationalising Giddens as Critical Explicator, *Failure & Lessons Learned from IS/IT Implementation: an International Journal*. Forthcoming.
- Kawalek, J., & Hackney, R., (1998b), Outsourcing the public sector: Operationalising Giddens, Case study paper, *European Conference in Information Systems*, France.
- Kawalek, J. & Johnson, P., (1998), Beyond incommensurability: towards epistemology for innovation, *European Conference in Information Systems*, France.

- Kawalek, J.P. & Hackney, R., (1998d), Strategic information systems planning (SISP) and the notion of end user innovation, *Journal of End User Computing*, forthcoming.
- Keen, P.G.W., (1980), MIS research: reference disciplines and a cumulative tradition, in McLean, E. & McFarlan, W., (eds), *Proceedings of the 1st International Conference on Information systems*, Philadelphia, pp. 9-18.
- Kent, W., (1978), *Data and reality: basic assumptions in data processing reconsidered*, Elsevier, Amsterdam.
- Kerr, C. & Dunlop, J., Harbison, F. & Myers, C.A., (1960), *Industrialism and Industrial Man*, Harvard University Press, New York.
- Kitsuse, J.I. & Cicourel, A.V., (1963), A note on the use of official statistics, *Social Problems*, **11**, 131-139.
- Klein, H.K. & Hirschheim, R., (1987), A comparative framework of data modelling paradigms and approaches, *Computer Journal*, **30**(1), pp. 8-15
- Klein, H. & Lyytinen, (1985), The poverty of scientism in Information Systems, in Mumford, E., Hirschheim, R., Fitzgerald, G. & Wood-Harper, T., (eds), *Research Methods in Information Systems*, Elsevier, Amsterdam.
- Klein, H. & Lyytinen, K., (1991), Towards a new understanding of data modelling, in Floyd, C., Zullighoven, H., Budde, R. and Keil-Slavik, H., (eds), *Software development and reality construction*, Springer-Verlag, Berlin.
- Kling, R., (1980), Social analyses of computing: theoretical perspectives in recent empirical research, *Computing Surveys*, **12**(1), pp. 61 -110
- Kling, R. (1987) Defining the boundaries of computing across complex organisations. In Boland, R. & Hirschheim, R. (eds) *Critical issues in information systems research*, Wiley, New York.
- Kling, R. & Scacchi, W., (1982), The web of computing: computer technology as social organisation, *advances in computers*, **21**, 1-90.
- Knights, D. & Willmott, H., (1987), Organisational culture as management strategy: a critique and illustration from the financial services industry, *International Studies of Management and Organisations*, **17**, 3, 40-63.
- Knights, D. & Willmott, H., (1993), It's a very foreign discipline: the genesis of expenses control in a Mutual Life insurance company, *British Journal of Management*, **4**, 1, 1-18.
- Kolb, D & Fry, R., (1975), Towards an applied theory of experiential learning, in Cooper, C.L., (ed), *Theories of group process*, Wiley, Chichester.
- Kreher, H., (1993), Critique of two contributions to soft systems methodology, *European Journal of Information Systems*, **2**(4), pp. 304-308.
- Kuhn, T.S., (1962), *The structure of scientific revolutions*, University Press, Chicago

- Kwon, T. & Zmud, R., (1987), Unifying the fragmented models of information systems implementation, in Boland, J., & Hirschheim, R., (eds), *Critical issues in information systems research*, Wiley, Chichester.
- Lambert, R. & Peppard, J., (1993), Information technology and new organisational forms: desinstitution but no road map?, *Journal of Strategic Information Systems*, 2(3), pp. 180 -205.
- Land, F., (1986), *Social aspects of information systems*, in Piercy, N., (ed), *Management information systems: the technology challenge*, Croom-Helm
- Land, F., (1987), From software engineering to information systems engineering, UNICOM, London.
- Land, F., (1992) *The Information Systems Domain* in Galliers, R.D. (ed.) *Information Systems Research: Issues, Methods And Practical Guidelines*, (Blackwell Scientific, Oxford)
- Land, F. & Hirschheim, R., (1983), Participative Systems Design: rationale, tools and techniques, *Journal of Applied Systems Analysis*, 10.
- Lash, S & Urry, J., (1987), *The end of organised capitalism*, Polity Press, Oxford.
- Lash, S., (1994), Reflexivity and its doubles: structure, aesthetics, community, in Beck, U., Giddens, A. & Lash, S., (eds), *Reflexive modernization*, Polity Press, Cambridge.
- Larrasquet, J.M., (1995), (ed), *Proceedings of the Projectics Conference*, Bayonne, France.
- Lee, H & Liebenau, J (1996) In what way are information systems social systems? - a critique from sociology, *UKAIS Conference*, Cranfield University, April.
- Lehman, C., & Tinker, A.M., (1987), The 'real' Cultural significance of accounts, *Accounting, Organisations and Society*, 12, 5, 503-522.
- Leonard-Barton, D.A., (1990), A dual methodology for case studies: synergistic use of a longitudinal single site with replicated multiple sites, *Organisation Science*, 1(3), pp 692 -724.
- Lewis, P.J., (1992), Rich Picture Building in the soft systems methodology, *European Journal of Information Systems*, 1(5), 351-360.
- Lewis, P.J., (1994), *Information-Systems Development*, Pitman, London
- Li, E.Y. & Rogers, J.C., (1991), An information systems profile of US companies, *Information and Management*, 21, 19-36.
- Liebenau, J. & Backhouse, J., (1990), *Understanding information*, Macmillan, Hants.
- Lincoln, Y.S. & Guba, E.G., (1985), *Naturalistic inquiry*, Sage, Beverly Hills
- Livingstone, E., (1986), *The ethnomethodological foundations of mathematics*, Routledge & Kegan Paul, London.
- Lockwood, D. (1956) Some remarks on "The social system", *British Journal of Sociology*, 7, 134-43.

- Lyytinen, K., (1992), Information systems and critical theory, in Alveson, M & Willmott, H., *Critical Management Studies*, Sage, London.
- Lyytinen, K., Different perspectives on information systems: problems and solutions, *ACM Computing Surveys*, **19**(1), 5-46.
- Lyytinen, K., & Hirschheim, R. A., (1987), Information Systems Failures - A Survey and classification of the empirical literature, *Oxford Surveys in information Technology*, **4**, pp. 258-309, Oxford University Press.
- Lynch, M., (1985), *Art and artifact in laboratory science*, Routledge & Kegan Paul, London.
- Macintosh, N.B. & Scapens, (1990), R.W., Structuration theory in management accounting, *Accounting Organisations and Society*, **15**(5), 455-77.
- Malone, T. and Crowston, K. (1990) What is co-ordination theory and how can it help design co-operative work systems?, *CSCW'90, Proceedings of the Conference on Computer Supported Co-operative Work*, ACM, New York.
- Marcus, M.L. & Robey, D., (1983), The organisational validity of MIS, *Human Relations*, **30**(5), pp. 203-226.
- Martin, C.J., (1990), What is an "end-user"? Identifying multiple relationships among information system users, *Proceedings of the 11th international conference on IS*, December, pp. 265-303
- Martin, J., (1982), *Application development without programming*, Prentice Hall, Englewood Cliffs.
- Martin, P.Y. & Turner, B.A., (1986), Grounded theory and organisational research, *The Journal of Applied Behavioural Science*, **22**(2), 141-157.
- Mason, D., & Willcocks, L., (1991), Managers, spreadsheets and computing growth: contagion or control?, *Journal of Information Systems*, **1**, 115-128.
- McFarlan, F W & McKenny, J L (1983), *Corporate Information Systems Management: the issues facing senior management*, Dow Jones Irwin
- McFarlan, W., (1984), Information technology changes the way you compete', *Harvard Business Review*, May-June, pp. 98-103.
- Mentzas, G.N., (1991), A review of object-orientation and knowledge processing in office models, *European Journal of Information Systems*, **1**, 193-203.
- Mentzas, G.N., (1993), Co-ordination of joint tasks in organisational processes, *Journal of Information Technology*, **8**, 139-150.
- Minzberg, H., (1977), *Impediments to the use of Management Information*, National Association of Accountants, New York, and the Society of Management Accountants of Canada, Ontario, Canada.
- Minzberg, H., (1978), *Patterns in strategy formulation*, *Management Science*, **24**(9), 934-48.
- Minzberg, H., (1987), *Crafting Strategy*, *Harvard Business Review*, July, pp 65-75.

- Minzberg, H., (1990), *The design school: reconsidering the basic premise of strategic management*, Strategic Management Journal, Vol 11, p. 171-195.
- Minzberg, H., (1994a), *Rethinking strategic planning part 1: pitfalls and fallacies*, Long Range Planning, Vol 27, no. 3, p.12-21.
- Minzberg, H., (1994b), *Rethinking strategic planning part 2: new roles for planners*, Long Range Planning, 27, 3, 22-30.
- Mestrovic, S.G. (1998), *Anthony Giddens, the last modernist*, Routledge, London.
- Mingers, J. & Brockelsby, J., (1996), Multimethodology: towards a framework for critical pluralism, *Systemist*, 18(3), pp. 101-131.
- Morgan, G., (ed), (1983), *Beyond method*, Sage, CA.
- Morgan, G. (1990) Paradigm diversity of organisational research. In Hasard, J. and Pym, D. (eds), *The theory and philosophy of organisations*, Routledge, London.
- Morgan, G., (1993), *Imaginisation: the art of creative management*, Sage, California.
- Mourdoukoutas, P., (1996), The race for global leadership : Europe, the USA and Japan, *European Business Review*, 96, 4.
- Mowshowitz, A., (1976), *The conquest of will - information processing in human affairs*, Addison-Wesley, Reading, MA.
- Mumford, A.C., (1982), Learning styles and learning skills, *Journal of Management Development*, 1, 2, 55-6
- Mumford, A.C., (1987), Helping Managers learn to learn - using learning styles and learning biography, *Journal of Management Development*, 6, 5, 49-60.
- Mumford, E., (1981), Participative systems design: structure and method, *Systems, Objectives, Solutions*, North Holland.
- Mumford, E., (1983), *Designing Human Systems*, Manchester Business School, Manchester.
- Mumford, E & Wier, M., (1979), *Computer systems in work design : the ETHICS method*, Wiley, New York
- Mumford, E., Hirschheim, R., Fitzgerald, G., Wood-Harper, A.T., (1985), (eds), *Research methods in information systems*, Proceedings of the IFIP WG 8.2 Colloquium, September 1984, Manchester Business School, Elsevier, Amsterdam.
- Mumford, E. & Beekman, G.J., (1994), *Tools for change and progress*, CSG Publications, Holland.
- Murray, P & Dhillon, G (1996), *Management of Benefits: interpreting IS/IT success in an NHS Trust environment*, Proceedings of the 3rd European Conference on the Evaluation of IT, University of Bath, November

- Nagel, E.,(1961), *The structure of science*, Routledge, London
- Newman, M., (1989), Some fallacies in Information Systems Design, *International Journal of Information Management*, 9(2).
- Nissen, Hans-Erik, Two questions methodology users better learn to ask, in Jayaratna, N., Wood-Harper, T., Fitzgerald, B., Larrasquet, JM., (eds), *Proceedings of the 5th BCS Conference on ISD Methodology*, (in print).
- Nolan, R., (1979), Managing the crises in data processing, *Harvard Business Review*, March-April, pp. 115- 126.
- Nonaka, I., (1991), The Knowledge Creating Company, *Harvard Business Review*, November-December, pp. 96-104.
- Niederman, F., Brancheau, J.C., & Wetherbe, J.C. (1991) Information Systems Management Issues for the 1990's, *MIS Quarterly*, 16(4), 474-500.
- Otley, D.T. & Berry, A.J., (1980), Control, organisation and accounting, *Organisations and Society*, 9, pp. 231-44
- Ouchi, W.G., (1979), A conceptual framework for the design of organisational control mechanisms, *Management Science*, 25, pp. 833-48.
- Orlikowski, W. & Baroudi, J., (1989), IS research paradigms: method versus substance, *Sloan Working Paper no. 3028-89-MS*. Massachusetts Institute of Technology, Cambridge, Mass.
- Orlikowski, W.J., (1990), The duality of technology: rethinking the concept of technology in organisations, *Sloan School of Management Working Paper no. 3141*, MIT.
- Ould, M.A. & Roberts, C., (1987), *Defining formal models of the software development process*, in Brereton, P. (ed), *Software Engineering Environments*, Ellis Horwood.
- Ould, M.A., (1992), Process Modelling with RADs. Part 1: The modeller's needs and the basic concepts of process modelling, *Iopener*, Volume 1, Number 5.
- Ould, M.A., (1993a), Process Modelling with RADs. Part 2: The modelling method and its notation, *Iopener*, Volume 1, Number 5.
- Ould, M.A., (1993b), Process Modelling with RADs. Part 3: Handling large and complex models, *Iopener*, Volume 1, Number 5.
- Ould, M.A., (1995), *Business Processes - Modelling and Analysis For Re-engineering and Improvement*, Wiley, Chichester.
- Pantin, C.P.A.,(1968), *The relations between the sciences*, Chapman & Hall, London
- Pava, C H P (1983), *Designing Managerial and Professional Work for High Performance: a socio-technical approach*, National Productivity Review, 2, pp126-135
- Peppard, J. (1993) Using IS/IT to gain competitive advantage. In Peppard, J. (ed) *IT strategy for business*, Pitman.

- Peppard, J, Dhillon, G & Hackney, R A (1996), *Emergent Strategies, Strategy Renewal and Serendipity in Business Strategy Creation: the challenge for IS/IT planning*, BIT'96, Manchester Metropolitan University, November
- Peters, T. (1989) *Thriving on chaos*, Harper collins, New York.
- Pettigrew, A.M., (1973), *The politics of organisational decision making*, Tavistock, London.
- Pettigrew, A., (1985), *The awakening giant: continuity and change in ICI*, Blackwell, Oxford
- Pettigrew, A., (1987a), Theoretical, methodological and empirical issues in studying change - response, *Journal of Management Studies*, **24**, 4, 420
- Pettigrew, A., (1987b), Context and action in the transformation of the firm, *Journal of Management Studies*, **24**, 6, 649-70.
- Pfeffer, J., (1981), Management as symbolic action: the creation and maintenance of organisation paradigms, *Research in organisation behaviour*, **3**, pp. 1-52.
- Plant, R., (1987), *Managing change and making it stick*, Fontana, London.
- Pollner, M., *Mundane Reason: reality in everyday and sociological discourse*, Cambridge University Press, Cambridge.
- Porter, M.E. (1979) How competitive forces shape strategy, *Harvard Business Review* March-April, 137-145.
- Porter, M.E., (1980), *Competitive strategy: techniques for analysing industries and firms*, Macmillan, New York.
- Porter, M.E., (1985), *Competitive advantage: creating and sustaining superior performance*, Free Press, New York.
- Porter, M.E., Millar, V.E., (1985), How Information gives you competitive advantage, *Harvard Business Review*, pp. 149-160.
- Porter, M.E., (1990), *The competitive advantage of nations*, Macmillan.
- Porter, M.E., (1994), The role of location in competition, *Journal of the economics of business*, **1**, 1.
- Power, R. & Laughlin, R., (1992), Critical theory and accounting, in Alvesson, M. & Willmott, H., (eds), *Critical Management Studies*, Sage, London, pp. 113-135.
- Poole, M.S. & Desanctis, G., (1989), *Understanding the use of group decision support systems: the theory of adaptive structuration*, in Steinfield, C. & Fulk, J., (eds), *Perspectives on organisations and new information technology*, Sage
- Popper, K., (1959), *The Logic of Scientific Discovery*, Hutchinson, London.
- Power, M. & Laughlin, R., (1992), *Critical Theory and Accounting*, in Alvesson, M. & Willmott, H., *Critical Management Studies*, Sage, London.

- Quade, E.S., (1971), The systems approach and public policy, *journal of systems engineering*, 2, 1, pp.23-34.
- Ramenyi, D. & Williams, B., (1995), Some aspects of methodology for research in information systems, *Journal of information technology*, 10, 191-201.
- Ranson, S., Hinings, G. & Greenwood, R., (1980), The structuring of organisational structures, *Administrative Science Quarterly*, 25, pp. 1-17.
- Rao, H.R., Pegels, C.C., Salam, A.F., Hwang, K.T., Seth, V., (1995), The impact of EDI implementation commitments and implementation success on competitive advantage and firm performance, *Information systems journal*, 5, pp. 185-202
- Reed, M., (1985), *New directions in organisational analysis*, Tavistock, London.
- Reed, M., (1988), The problem of human agency in organisational analysis, *Organisational studies*, 9, pp. 33-46.
- Reason, P. & Rowan, J., (1981), *Human inquiry*, John Wiley, New York
- Reinhardt, J., (1994), The Ideology of competitiveness, *Monthly Review*, 46(6), 1994, pp. 15-23.
- Reynolds, G.W., (1992), *Information systems for managers*, West Publishing Company, St Paul.
- Roberts, J., Strategy and Accounting in a UK Conglomerate, *Accounting, organisations and society*, 15(1/2), 107-26.
- Rochester, J.B., (1989), The strategic value of EDI, *IS analyser*, 27(8).
- Rockart, J.F., (1979), Chief executives define their own information needs, *Harvard business Review*, March -April
- Rockart, J.F. & Flannery, L.S., (1983), The management of end-user computing, *Communications of the ACM*, 26(10), pp. 776-784.
- Rorty, R., (1979), *Philosophy and the mirror of nature*, Princeton university Press, Princeton.
- Romm, N. (1995) Knowing as Intervention: Reflections on the Applications of Systems Ideas, *Systems Practice* 8(2), pp 139-159.
- Rose, N., & Millar, P., (1992), Political power beyond the state: problematics of government, *British Journal of Sociology*, 43, 2, 173-205.
- Richie, A.D., (1945), *Civilisation, science and religion*, Penguin, Harmondsworth
- Riley, P., (1983), A structurationist account of political culture, *Administrative Science Quarterly*, 28, 414-37
- Russell, N. and Muskett, S. (1993) Reaping the benefits of a responsive IT department, *Journal of Information Technology*, 8, 50-57.
- Sayer, A., (1984), *Method in social science*, Hutchinson, London.

- Scarborough, H., & Corbett, J.M., (1992), *Technology and organisation, power, meaning and design*, Routledge, London.
- Schutz, A., (1962), *The problem of social reality*, Martinus Nijhoff, The Hague
- Schutz, A., (1964), *Studies in social theory*,
- Schutz, A., (1967), *The phenomenology of the social world*, North western University Press, Evanston, Ill.
- Schutz, A., (1970), *On phenomenology and social relations*, University of Chicago Press, Chicago
- Schutz, A., (1972), *The phenomenology of the social world*, Heinemann.
- Scott Morton, M.S. (ed) (1991) *The corporation of the 1990s*, Oxford University Press.
- Sechrest, L., (1992), Roots: Back to our first generations, *Evaluation Practice*, 13, 1-8
- Shani A.B. & Sena J.A. (1993), I.T.'s and structural change: the case of local network implementation, *Journal of Information Technology* 8, pp. 34-
- Shank, M.E., Boynton, A.C., Zmud, R.W., (1985), Critical Success Factor Analysis as a methodology for MIS planning, *MIS Quarterly*, June 1985.
- Shannon, C. & Weaver, W., (1964), *The mathematical theory of communication*, University of Illinois.
- Silverman, D. (1970) *The theory of organisations*, Heinemann, London.
- Sipior, J.C. & Sanders, G.L., (1989), Definitional distinctions and implications for managing end user computing, *Informaiton and management*, 16(3), pp. 115-123.
- Slack, N. & Cooke, S., (1991), *Making management decisions*, Prentice Hall, Hemel Hempstead.
- Smith, C. Knights, D. & Willmott, H., (1991), White collar work: the non-manual labour process, Macmillan, Hants.
- Sockalingam, S. & Doswell, A., (1997), A Conflict Strategy for BPR, Proceedings of the 5th *European Conference on Information Systems*, 602 - 617.
- Somogyi, E.K. & Galliers, R.D., (1987), *From data processing to strategic information systems - a historical perspective*, in Somogyi, E.K. & Galliers, R.D., (Eds), *Towards strategic information systems*, Abacus Press,
- Stacey, R (1993), *Strategic Management and Organisational Dynamics*, Pitman Publishing
- Stamp, E., (1969), The public accountant and the public interest, *Journal of Business Finance*, 32-42.
- Stamper, R., (1988), Analysing the cultural impact of a system, *International Journal of Information Mangement*, Vol. 8, No. 3.

- Stanworth, P. & Giddens, A., (1974), An economic elite: a demographic profile of company chairmen, in Stanworth, P. & Giddens, A., (eds), *Elites and power in British Society*, Cambridge University Press, Cambridge.
- Strauss, A., (1987), *Qualitative analysis for social scientists*, Cambridge University Press, New York.
- Strauss, A. & Corbin, J., (1990), *Basics of qualitative research*, Sage, London.
- Strauss, A. & Corbin, J., (1994), *Grounded Theory An Overview*, in Denzin, N.K. & Lincoln, Y. S., (1994), *Handbook of qualitative research*, Sage, London, pp. 273-285.
- Sterling, R.R., (1979), *Towards a science for accounting*, Scholar books, Houston.
- Stewart, T. A. (1992), The search for the organisation of tomorrow, *Fortune*, May, 93-98.
- Stowell, F. (1989), Change, organisation, power and the metaphor 'commodity', PhD dissertation, University of Lancaster.
- Sullivan, C.H. Jr., (1985), Systems Planning in the Information Age, *Sloan Management Review*, Winter 1985, pp. 3-11
- Swanson, B., (1985), Information systems: necessary foundations, Information systems working paper, 6-85, UCLA-Graduate School of Management, Los Angeles.
- Swatman, P.M.C., (1994), Business Process Redesign using EDI: the BHP Steel Experience, *Australian Journal of Information Systems*, 2(1), pp. 55-73
- Tapscott, D., (1996), The digital economy : promise and peril in the age of networked intelligence, McGraw-Hill
- Taylor, F., (1947), *Scientific Management*, Harper & Row, London.
- Tinker, A.M., (1991), The Accountant as Partisan, *Accounting, Organisations and Society*, 16, 3, 297-310.
- Tornatzky, L. & Klein, K., (1982), Innovation characteristics and innovation adoption implementation: a meta-analysis of findings, *IEEE Transactions on Engineering Management*, February, 28-45.
- Trice, H.M., (1956), Outsiders role in field study, *Sociology and social research*, 41, 27-32.
- Turner, B.A., (1983), The use of grounded theory for the qualitative analysis of organisation behaviour', *Journal of Management Studies*, 20(3), pp. 333-348.
- Tushman, M.L. & Scanlan, T.J., (1981), Characteristics and external orientations of boundary spanning individuals, *Academy of Management Journal*, 24, 1, 83-97.
- UK Academy of Information Systems, (1996), *Newsletter*, 1(3)
- Van Den Berghe, P.L. (1969) Dialectic and functionalism: towards a theoretic synthesis. In Wallace, W.L. (ed) *Sociological theory*, Heinemann, London.

- Vidgen, R., (1996), *A multiple perspective approach to information system quality*, PhD thesis, University of Salford.
- Vitalari, N.P., (1985), *The need for longitudinal designs in the study of computing environments*, in Mumford, E., Hirschheim, R., Fitzgerald, G. & Wood-Harper, A.T., *Research methods in information systems*, Elsevier, North Holland.
- Waema, T.M. & Walsham, G., (1990), Information systems strategy formulation, *Information and Management*, pp. 29-39.
- Walsham, G., (1991), Organisational metaphors and information systems research, *European Journal of Information Systems*, **1**, 2, pp. 83-94.
- Walsham, G., (1993a), *Interpreting information systems in organisations*, Wiley, Chichester.
- Walsham, G., (1993b), Reading the organisation: metaphors and information management, *Journal of information systems*, **3**, pp. 33-46.
- Walsham, G., (1993), Decentralisation of IS in developing countries: power to the people?, *Journal of Information Technology*, **8**, pp.74-81.
- Walsham, G. & Han, C-K., (1991), Structuration Theory and Information Systems Research, *Journal of Applied Systems Analysis*, **17**, 77-85.
- Ward, K., (1995), *Financial Information Systems as a source of added value in business process re-engineering*, Professorial Lecture, Sheffield Hallam University, December.
- Ward, J., Griffiths, P. & Whitmore, P., (1990), *Strategic Planning for Information Systems*, Wiley, Chichester.
- Ward, J., & Griffiths, P., (1996), *Strategic Planning for Information Systems*, Wiley, Chichester (2nd Ed)
- Wastell, D.G., White, P. & Kawalek, P., (1994), A methodology for business process redesign: experiences and issues, *Journal of Strategic Information Systems*, **3**(1).
- Wastell, D.G. & Sowards, A., (1995), An information system profile of the UK manufacturing sector, *Journal of Information Technology*, **10**, 179-189.
- Wastell, D.G., (1996), The fetish of technique: methodology as a social defence, *Information Systems Journal*, **6**, 25-40.
- Watson, R.T. & Brancheau J.C. (1991) Key Issues In Information Systems Management: An international Perspective, in Galliers, R.D. (ed.) 'Information Systems Research: Issues, Methods And Practical Guidelines', (Blackwell Scientific, Oxford) pp. 112-131.
- Weaver, P.L., (1993), *Practical SSADM version 4*, Pitman, London.
- Weber, M., (1947), *The theory of social and economic organisation*, Free Press, Glencoe, Ill.
- Webster, F., (1995), *The information society*, Routledge

- Weick, K.E., (1976), Educational institutions as loosely coupled systems, *Administrative Science Quarterly*, **21**, 1-19.
- Weick, K E (1990), *Technology and Equivocation: sense making in new technologies*, in Goodman PS & Sproull LS, *Technology and Organisations*, Jossey-Bass, Oxford
- Weiss, P.A. (1969), *The Living System: determinism stratified* in Koestler, A. & Smithies, J.R., *Beyond Reductionism*, Hutchinson, London
- Whittington, R., (1993), *What is strategy and does it matter?*, Routledge
- Whittington, R., (1992), Putting Giddens into action: social systems and managerial agency, *Journal of Management Studies*, **29**(6), p. 693-712
- White, D., (1986), Information use and needs in manufacturing organisations: organisational factors in information behaviour, *International Journal of Information Management*, **6**, 3, p.157-170.
- White, D., (1989), *Organisational conflict in the library setting*, Phd Thesis, Sheffield University
- Willcocks, L., (1994), *Managing Information Technology Evaluation*, in Galliers, R.D. & Baker, B.S.H., (1994), *Strategic Information Management*, Butterworth-Heinemann, Oxford, pp. 362-381.
- Willcocks, L. & Margetts, H., (1994), Risk assessment and information systems, *European Journal of Information Systems*, **3**(2), 127-138.
- Williamson, O.E., (1991), *Strategizing economizing and economic organisation*, *Strategic Management Journal*, **12**, 75-94.
- Willmott, H., (1981), The structuring of organisation structure: a note, *Administrative Science Quarterly*, **26**, pp. 470-4
- Willmott, H., (1986a), Unconscious sources of motivation in the theory of the subject: an explanation and critique of Giddens' dualistic models of action and personality, *Journal for the theory of social behaviour*, **16**, 1, pp. 105-21
- Willmott, H., (1986b), Organising the profession : a theoretical and historical examination of the major accountancy bodies in the UK, *Accounting, organisation and society*, **11**, 6, pp. 555-580
- Willmott, H., (1987), Studying managerial work: a critique and a proposal, *Journal of Management Studies*, **24**, 3, pp. 249-70.
- Willmott, H., (1989), Subjectivity in the dialectics of praxis: opening up the core of the labour process analysis, in Knights, D. & Willmott, H., (eds), *Labour process theory*, Macmillan, London.
- Willmott, H., (1990), *Beyond paradigmatic closure in organisational enquiry* in Hassard, J. & Pym, D. (eds), *The theory and philosophy of organisations*, pp 44-62, Routledge, London.
- Willmott, H., (1993a), *Breaking the paradigm mentality*, *Organisation Studies*, **14**, 5, 681-719.
- Willmott, H., (1993b), *Paradigm gridlock: a reply*, *Organisation Studies*, **14**, 5, 727-730.

- Wilson, B., (1991) Information Management, in Jackson, M., Mansell, G., Flood, R., Blackham, R., & Probert, S., *Systems Thinking in Europe*, Plenum Press, New York, pp. 89-97.
- Wilson, D., (1997), Maturity models in IS development, *Proceedings of the Information Resources Management International Conference*, 419-426.
- Wilson D.C. (1992), *A strategy of change*, Routledge.
- Windelband, W., (1901), *History of philosophy*, McMillan, London.
- Winter, M.C., Brown, D.H. & Checkland, P.B., (1995), A role for soft systems methodology in information systems development, *European Journal of Information Systems*, 4, 130-142.
- Wiseman, C., (1985), *Strategy and computers*, Dow Jones-Irwin.
- White, O. (1983) Improving the prospects for heterodoxy in organisation theory, *Administration and Society*, 15, 257-272.
- Whittington, R., (1993), *What is strategy and does it matter?* Routledge.
- Whittington, R., (1992), Putting Giddens into action: social systems and managerial agency, *Journal of Management Studies*, 29(6), p. 693-712
- Wood-Harper, A.T. & Fitzgerald, G., (1982), A Taxonomy of Current Approaches to Systems Analysis, *The Computer Journal*, 25(1).
- Yaverbaum, G.J., (1988), Critical success factors in the user environment: an experimental study of users, *MIS Quarterly*, 12(1), March, pp.75-88.
- Yin, R.K., (1989), *Case study research: design and methods*, Sage, Beverly Hills
- Yourdon, E. (1989), *Modern structured analysis*, Prentice Hall, Englewood Cliffs, NJ.
- Zimmerman, D.H., (1970), *The practicalities of rule use*, in Douglas, J., (ed), *Understanding everyday life*, pp. 221-238, Aldine, Chicago.
- Zimmerman, D.H., (1988), *On Conversation: the conversation-analytic perspective*, in Anderson, J.A., (ed), *Communications Yearbook*, 11, pp. 406-432, Sage, CA.
- Zuboff, S., (1988), *In the age of the smart machine*, Basic Books
- Zuboff, S., (1994), *Informate the enterprise: an agenda for the twenty first century*, in Cash, J.I. (Jr), Eccles, R.G., Nohria, N. & Nolan, R., (1994), *Building the Information Age Organisation*, Irwin, pp. 226 - 233.